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Research Article

Influence of Non-Hormonal Intervention On Lipid Profile Among Perimenopausal Women.

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Abstract: This study aims to find the effect of a non-hormonal therapy to help solve dyslipidemia among perimenopausal women. The objective of achieving this aim was to find the effect of soya supplementation on low-density lipoprotein (LDL), high-density lipoprotein (HDL), and total cholesterol (TCL) levels among perimenopausal women with dyslipidemia. This single-blinded quasi-experimental study was conducted in a rural community in southern India with 54 perimenopausal women in 40-55 age. The subjects were randomized into a control group that received only structured health education and an experimental group that received structured health education, and soya supplements 50 grams of soya meal curry on alternative days for 3 days a week for 16 weeks. The three-outcome analysis for the study HDL, LDL, and TCL levels was analyzed as a part of baseline selection criteria (Pre-test), following 8 weeks (Post-test 1) and 16th weeks (Post-test 2), respectively. The study results showed that all three biomarkers normalized significantly better in the experimental group than in the control group. The study supports the statement that a soya diet can be an adjunct to estrogen therapy. Hence, the study favors using a soya diet as a treatment choice for managing dyslipidemia among perimenopausal women.

Keywords: Soya chunk, estrogen, perimenopausal women, HDL, LDL, TCL, Dyslipidemia, non-hormonal therapy.

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1. INTRODUCTION

Perimenopausal women are transitioning from their reproductive years to menopause, which is the cessation of menstruation. Perimenopause typically occurs in the late 30s to early 50s and can last anywhere from a few months to several years. During this time, women may experience various physical and emotional symptoms, including hot flashes, night sweats, mood swings, sleep disturbances, vaginal dryness, and changes in menstrual cycles. There are reports that one-third of this population consult a physician for some health ailments, and they are often referred for hormonal therapy [1,2] Women in perimenopause need to maintain a healthy lifestyle, seek medical advice if symptoms are severe or interfere with daily life, and consider hormonal or non-hormonal treatments to manage symptoms. Hormone Replacement Therapy (HRT) is a treatment that involves taking hormones to replace those that the body no longer produces after menopause. HRT can help relieve hot flashes, night sweats, mood swings, and vaginal dryness. [3,4]. While HRT can effectively relieve symptoms, it has several potential drawbacks and risks. Some of the most common drawbacks of HRT include the high vulnerability to breast cancer in the long run. [5] Making lifestyle changes like eating a healthy diet, exercising regularly, getting enough sleep, and reducing stress can help manage perimenopausal complications. [6] However, the effect size for this intervention is minimal. Medications like antidepressants, anti-anxiety, and blood pressure medications can help relieve symptoms like hot flashes, mood swings, and high blood pressure. [7], but their influence on the quality of life is questionable. Vaginal estrogen therapy can help relieve vaginal dryness, itching, and pain during intercourse. [8] However, this approach also has a lot of side effects and drawbacks. [9] With all such drawbacks, Nutritional solution becomes a major non-hormonal therapy as it is safe and the changes are organic. It's been applied to many conditions and proved effective [10] Though animal protein is considered to be complete and plant protein was known to lack few essential proteins, Soya chunks are considered to be far superior to other vegetable sources. [11,12] Though Soya is being tried in various conditions, its effect on reducing perimenopausal symptoms is not studied to the best of our knowledge. The impact of soya, which is a protein source, on the lipid profile has been a recent research subject in other conditions. It is believed that protein supplements have effectively reduced cardiovascular risk.[13,14] In the case of perimenopausal women, there seems to be a gradual decline in high-density lipoprotein (HDL) and the corresponding increase in low-density lipoprotein (LDL) and total cholesterol (TCL). [15,16] With such a scenario, this study tries to find the effect of soya supplementation as a non-hormonal solution to perimenopausal changes in lipid profile, particularly the LDL, HDL, and TCL.

2. METHODOLOGY

2.1. Study setting

The single-blinded quasi-experimental study was conducted in a rural setup (community) in southern India. The study screened all the perimenopausal women residing in Kuthambakkam village which included many streets and with due permission from the local administration bodies, the survey was conducted. This village was selected based on its vicinity to our hospital and was perceived to have more target population as reported by the community visits.

2.2. Type and period of study

It was a quasi-experimental study with two groups performed in October 2019 and completed by February 2021. The study included samples from the target population in Kuthambakkam village. The study was termed quasi because the samples were not selected randomly. Instead, the samples were selected using a consecutive sampling method, one of the convenient sampling techniques. All 27 subjects underwent post-test 1, but two dropouts were in each group following the 6th week. They were not considered for the final data analysis as the dropouts were accounted for during sample size estimation. The study was halted in-between for six months owing to the COVID-19 pandemic spread in India from April 2020 to July 2020.

2.3. Study target population

- ***Inclusion criteria***

Inclusion criterias used for the study were women aged 40-55 who missed their period frequently, had a first cycle longer than 60 days, and presented with dyslipidemia tested within 3 months before. All the selected participants from the Kuthambakkam village could read and write Tamil and were willing to participate in the research. All the participants were initially screened for a history of dyslipidemia, and only subjects with an abnormality in all or any of the selected biomarkers (HDH, LDL, and TCL) were selected for the study.

- ***Exclusion Criteria***

Subjects undergoing HRT, suffering from chronic systemic disease, bleeding disorder, and obese subjects with body mass index (BMI) of over 30 were excluded from the study.

2.4. Sampling

The sample size required for the study was selected using the effect size obtained from a similar study (effect size 0.21) using G-power software version 3.1.1.2. The sample size required was 48. The sample size was inflated by 10% to account for the dropouts; hence, a sample size of 54 was approximately considered. The samples were randomized using the random table method into two groups, namely a control group (CNG) and an experimental group (EXG) in a 1:1 ratio. All 27 subjects underwent post-test 1, but two dropouts were in each group following the 6th week. They were not considered for the final data analysis as the dropouts were accounted for during sample size estimation.

2.5. Group intervention

The control group received structured health education containing information including the meaning of perimenopause, signs, and symptoms, and the cause of early perimenopause problems. They were also educated on selected health problems like weight gain, osteoporosis, and anemia, at the same time, measures to counter them like a balanced diet, recommended daily allowance of calcium and iron with dietary examples, benefits of physical activity and exercises, and followed-up for the entire study duration and supported with continuous educational support and diet recommendations. The experimental group received

structured health education at the start of the intervention. It was later subjected to a soya supplement of 50 grams of soya meal curry on alternative days for 3 days a week (Monday, Wednesday, and Friday) for 16 weeks. and the nutritional composition of the food to be stated. Table 6 illustrates the ingredients preferably added to the meal with brief instructions on how to prepare the dish with the final nutritional value of the dish.

- ***Soya chunks curry – Ingredients***

1. Soya chunks (soaked) -100 grams
2. Onions (medium size) -2
3. Ginger garlic paste - tsp
4. Tomato (grained) medium - 2
5. Green chili - 1

- ***Preparation***

Heat oil in a pan. Add mustard, curry leaves, onions, and green chili; fry till onions turn golden; add the ginger garlic paste and grained tomatoes; add gram masala and salt as per taste. Transfer soya chunks and add water to make gravy. Cook for 10 minutes.

- ***Nutritional Value – per 100 grams of soya chunk.***

Calories - 244 K. cal
Carbohydrates - 20 grams
Protein - 20 grams Fat - 8 grams
Sodium - 456 mg
Potassium - 178 mg
Calcium - 15.6%
Iron - 28.8 %
Vitamin -A -3.2%
Instruction for preparation and final nutritional value of the dish.

2.6. Data collection

The three-outcome analysis for the study was high-density lipoprotein (HDL), low-density lipoprotein (LDL), and total cholesterol (TCL). The outcomes were analyzed in three different temporal variations as a baseline analysis before the start of the intervention (Pre-test), following 8 weeks of intervention (Posttest 1), and on the 16th week following the intervention (Posttest 2), respectively. The evaluator and the person who allocated generated random numbers and were blinded to the samples and group allocation.

2.7. Blood sampling

Participants provided blood specimens for lipoprotein analysis between 8:00 a.m. and 10:00 a.m. after at least 8 hours of fasting overnight. The participants relaxed in the supine position, and then the blood was drawn using Terumo Venoject VT-100PZ vacuum tubes without a tourniquet. The three biomarkers, HDL, LDL, and TCL, were enzymatically separated within 3 days of collection by a combination of ultracentrifugation and precipitation. [17] The primary researcher was responsible for collecting and organizing these outcomes.

2.8. Ethical considerations

All the subjects in this study signed an informed consent following a brief orientation about the procedural requirements and the need to draw blood which was an invasive procedure. This study was approved by the institutional ethical committee at Saveetha Institute of Medical and Technical Sciences, Chennai, Tamil Nadu, India (IEC . NO- 001/09/2019/IEC/SMCH)

2.9. Statistical analysis

The study data were analyzed using SPSS software version 26. The significance level was fixed at $p<0.005$ at a confidence level of 95%. The data were analyzed for baseline homogeneity regarding demographic variables using chi-square and independent t-test. Distribution analysis was performed using the Kolmogorov-Smirnov test. The outcome measures were analyzed using ANOVA (within group) and independent t-test (between-group). Post Hoc analysis was performed using the Bonferroni test.

3. RESULTS

The demographic details of both groups are presented in Table 1. The temporal variations in the lipid profile are presented in Tables 2 and 3. The post hoc analysis showed a continuous and gradual change in the experimental group for all three outcomes, but the same was not observed in the control group. The pairwise comparison is presented in Table 4. The multivariate analysis is presented in Table 5.

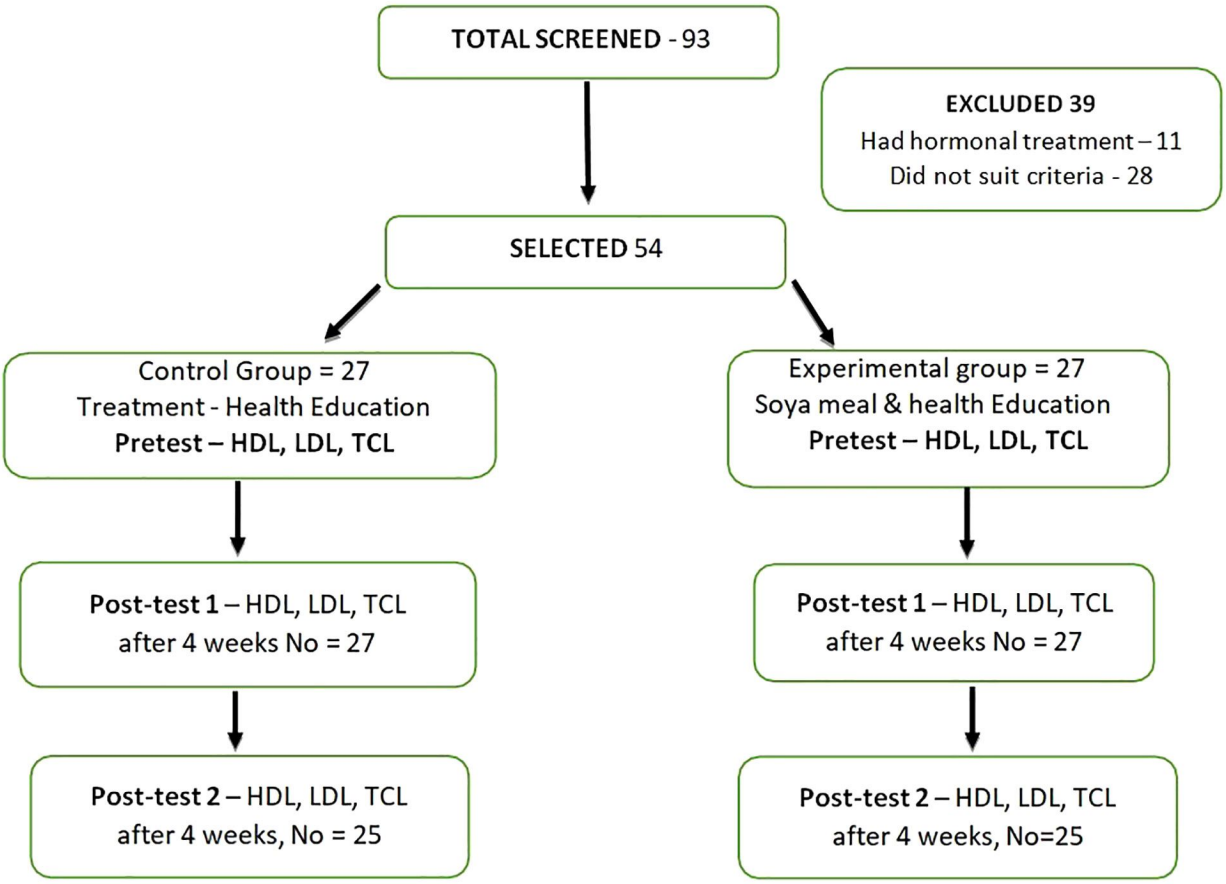

Fig 1: Flow chart of Study-Not in results include in the methodology

Table 1: Demographic data of both groups participants-Rearrange the table neatly with proper columns

Criteria	Control	Experimental	Significance
Age (years) 40-45 46-50 51-55	 5 12 10	 4 11 13	 Chi-square = 0.587 P= 0.745
BMI	28 (1.2)	27 (1.8)	t = 1.223, p=0.821
Education	Illiterate – 2 Higher Secondary - 14 Graduate or more - 11	Illiterate – 1 Higher Secondary - 11 Graduate or more - 15	Chi-square = 0.247 P= 0.507
Employment	Employed - 8 Unemployed – 19	Employed – 5 Unemployed - 22	Chi-square = 0.621 P= 0.527
Number of hospital visits	1.8 (1.2)	2.1 (0.9)	t = 6.32 p=0.141
Diet preference	Vegetarian – 7 Non-vegetarian - 20	Vegetarian – 12 Non-vegetarian - 15	Chi-square = 0.921 P= 0.02

BMI– Body mass index.

Table-1 illustrates that the demographic information collected before the commencement of intervention was similar in both groups; hence, these factors may not be confounding in this research.

Table 2: Outcome measure analysis – Between group (Independent t-test)

Outcomes	Tests	Control group	Experimental group	P value
HDL	Pre-test	38.45 (3.45)	39.12(2.45)	0.122
	Posttest 1	38.91(2.87)	44.17(2.15)	0.001*
	Posttest 2	40.22 (1.25)	46.75(3.22)	0.001*
LDL	Pre-test	144.12(6.25)	148.25(8.19)	0.214
	Posttest 1	142.23(7.12)	140.21(7.25)	0.098
	Posttest 2	140.12(4.23)	133.15(6.99)	0.012*
	Pre-test	234.12(21.22)	241.17(18.23)	0.102

TCL	Posttest 1	235.25(19.25)	230.11(19.21)	0.024*
	Posttest 2	228.12(18.75)	220.18(14.12)	0.001*

**** Significant difference. HDL – High-density lipoprotein, LDL – Low-density lipoprotein, TCL – total cholesterol.***

Table 2 shows a significantly better improvement in the experimental group in HDL and TCL immediately during post-test 1; however, the LDL reduced only in the long run.

Table 3 Outcome measure analysis - Within group (ANOVA)

Outcome	Group	Pre-test	Posttest 1	Posttest 2	P value
HDL	Control	38.45 (3.45)	38.91(2.87)	40.22 (1.25)	0.104
	Experimental	39.12(2.45)	44.17(2.15)	46.75(3.22)	0.027*
LDL	Control	144.12(6.25)	142.23(7.12)	140.12(4.23)	0.214
	Experimental	148.25(8.19)	140.21(7.25)	133.15(6.99)	0.001*
TCL	Control	234.12(21.22)	235.25(19.25)	228.12(18.75)	0.041*
	Experimental	241.17(18.23)	230.11(19.21)	220.18(14.12)	0.001*

**** Significant difference, HDL – High-density lipoprotein, LDL – Low-density lipoprotein, TCL – total cholesterol.***

Table 3 Within-group analysis of HDL, LDL, and TCL. The results show that the experimental intervention significantly improved all the biomarkers, whereas the control intervention showed only a marginal improvement in TCL.

Table 4: Post Hoc analysis – Bonferroni test

Group	PAIRS	HDL	LDH	TCL
Control	**Pre vs. Post 1**	0.877	0.712	0.897
	Post 1 Vs. Post 2	0.102	0.112	0.001*
	Pre vs. Post 2	0.091	0.001*	0.001*
Experimental	**Pre vs. Post 1**	0.001*	0.001*	0.001*
	Post 1 Vs. Post 2	0.012*	0.001*	0.001*
	Pre vs. Post 2	0.001*	0.001*	0.001*

**** Significant difference, HDL – High-density lipoprotein, LDL – Low-density lipoprotein, TCL – total cholesterol.***

Table 4 illustrates the pairwise comparison of the temporal variables in both groups for all three lipids. The results show how the experimental group produced better results in every research stage in all three biomarkers.

Table 5: Multivariate analysis of factors associated with Dyslipidemia

Factors	Types of dyslipidemia		
	TCL	HDL	LDL
Obesity	2.06(0.63)	0.63 (0.88)	3.24 (0.47)
Sedentary lifestyle	0.01 (0.89)	0.227 (0.78)	1.48 (0.22)
The onset of symptoms duration	2.41 (0.39)	0.69 (0.75)	1.92 (0.42)
Diabetes mellitus	0.55 (0.57)	1.14 (0.42)	0.20 (0.74)
Hypertension	0.87 (0.38)	0.01 (0.87)	0.038 (0.87)
Occupation	0.99 (0.12)	0.278 (0.78)	1.22 (0.12)

Table 5 illustrates the multivariate regression analysis results that are very much compared to those presented in previous tables and indicates how these 6 determinants influence the relationship between the dependent and independent variables.

4. DISCUSSION

This study was intended to find a better non-hormonal therapy as a harmless replacement for hormonal therapy for perimenopausal women. -repetition As an educational institute and medical college, the primary intention of this health team is to improve women's health, and we prioritized perimenopausal women in the current research. Our previous screening showed that there was more suffering among women with complications of the perimenopausal stage, and there was also poor awareness. The study is most needed as there is a high prevalence of dyslipidemia among perimenopausal women globally, particularly HDL, LDL, and TCL, having a prevalence rate of 25.3%, 47.7%, and 53%, respectively. [18] The primary researcher provided clues about the ingredients to prepare a soya meal to all participants. The ingredients' details and nutritional value are presented in Table 5. Our results demonstrated that Soya chunk administration had shown a better prognosis in increasing the HDL numbers than health education alone. It is significant to note that in health education, patients were educated about the need for protein in countering the complications of the peri-menopausal stage. Significantly, the control group had more nonvegetarians (20/27), yet they did not improve their lipid status compared to the experimental group, which had fewer non-vegetarians (12/27). Our results are significant as animal protein is of good quality and complete compared to plant-derived.[11,12]. Decreased quantity of estrogen among menopausal women results in hot flashes, genital epithelial atrophy, and another degenerative joint disease like

osteoarthritis and spondylosis [19]. Supplement of Estrogen can potentially relieve the majority of menopausal symptoms [20]. Isoflavones have an identical chemical structure to estrogen. Isoflavones are abundant in soya, and a strict soya diet can result in similar results to estrogen supplementation, which shows up in the current study. A weak binding affinity is observed for the isoflavones in the soya with estrogen receptor sites, which results in an estrogen-like activity.[21,22]. Much research is going on around the globe that concentrates on making isoflavones in the soya as an able replacement for hormonal therapy [22,23]. However, the same is tried as an early alternative to such a population in the perimenopausal time in the current study. Previous study results have replicated the current results but not on the lipid profile but on the hot flashes demonstrating excellent results with a soya diet among menopausal women. [24].. [25–27]. Some studies showed a significant improvement in the quality of life among menopausal women with soya administration acting as an able replacement for hormonal therapy.[25] The current study focused on the three biomarkers and did not consider Triglycerides and very low-density lipoprotein because they did not show significant association with the perimenopausal complications. [15] The study's main limitation was that there was no strict monitoring of the dietary routine of both groups apart from the emphasis on the soya diet. The study was confined to a small village, and the study results can't be generalized to other populations like urban populations. The study excluded subjects with comorbidity and obesity which can be a limitation for the external validity of the current study results but surely scope for future studies.

5. CONCLUSION

The present study supports the statement that a soya diet can be an adjunct to estrogen therapy. Hence, the study favors using a soya diet as a treatment choice for managing dyslipidemia among perimenopausal women. Further studies should concentrate on other perimenopausal complications with other biomarkers. Future studies should consider various age groups to determine whether the current study results are generalizable.

6. AUTHOR'S CONTRIBUTION STATEMENT

Mrs. Muthulakshmi C, the Researcher, conceptualized and gathered the data about this work. Dr. S Kalabarathi and Dr. Nithi Sharma analyzed these data, and necessary inputs were given to word the design of the manuscript. All the authors discussed the methodology and results and contributed to the final manuscript.

7. CONFLICT OF INTEREST

Conflict of interest declared none.

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