

Assessing the relationship between dietary pattern and Menopausal quality of life among euthyroid and hypothyroid disorder perimenopausal women

Shanthini PRIYA PRAKASH, Silambu SELVI KUMBAMOORTHY

Clinical Nutrition and Dietetics Department, SRM Medical College Hospital and Research Centre, SRMIST, Kattankulathur, Chennai.

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ABSTRACT

Background: Thyroid disorders are found to be the most common endocrine disorders among women in India. Perimenopause women during the transition through menopause experience specific symptoms such as mood swings, hot flashes, sleep disturbances, forgetfulness, weight gain and vaginal dryness. These symptoms disturb the perimenopausal women's day-to-day life and lead to a decrease in the quality of life (QoL).

Aim: To assess the relationship between dietary pattern and Menopausal Quality of Life among euthyroid and hypothyroid perimenopausal women.

Methods: This community-based cross-sectional study comprised 96 perimenopausal women participants among them 54 had euthyroid and 42 had the hypothyroid condition. This study was conducted in a selected area of Chengalpattu district, Tamil Nadu, India between January 2022 and April 2022. A standardized Menopause Quality of Life questionnaire (MENQOL) tool was used to assess their Menopausal QoL and the dietary pattern was analyzed using the 24-hour recall method. Data were examined statistically through descriptive and associative statistics by using the variables dietary pattern and Menopausal QoL.

Results: The dietary pattern of the euthyroid group (18.5%) was good compared to the hypothyroid group (9.5%). The Menopausal QoL of the euthyroid group (41.7%) was more normal than the hypothyroid group (14.7%). The

correlation was found to be positive ($R= 0.468$) and the test was significant ($P < 0.01$).

Conclusion: This study concluded that there is a positive relationship between the dietary pattern and Menopausal QoL among perimenopausal women having thyroid dysfunction.

KEYWORDS

Perimenopause, Hypothyroidism, Dietary habits, Menopausal Quality of Life.

INTRODUCTION

Hypothyroid disease is a very common public health problem in women across the world and is considered to be the most frequent endocrine disorders among women in India^{1,2}. According to a recent study the predominance of hypothyroidism is highly affecting 1 out of 10 grown-ups in the Indian population. Female and older age groups have a considerably associated with hypothyroidism^{3,4}. Impact of thyroid dysfunction on reproductive health is more prevalent in women^{5,6}. The serum concentration of thyroid stimulating hormone (TSH) increases with age and in iodine deficient areas. Therefore, older age is a major cause for the higher frequency of hypothyroidism⁷. Estrogen hormone has a significant role as a causation of thyroid disease. Estrogen increases the thyroxine-binding globulin's serum concentration by stimulating the protein's sialylation, which reduces its clearance. This also magnifies its biosynthesis. Thus results in an upgradation of thyrotropin and TSH level^{8,9}. With aging, triiodothyronine level increases and TSH level remains normal but in some circumstances it has a tendency to increase^{10,11}. There have been few studies on the association between perimenopause and thyroid function, but it is unclear if perimenopause affects thyroid function regardless of aging^{12,13}. The women's menopausal transition influ-

Correspondencia:
Shanthini Priya Prakash
sp7757@srmist.edu.in

ences beyond reproduction and also the certain symptoms that accompany changes in psychosomatic domains, physical health and personal life^{14,15}. Routine screening of thyroid disease is advised for perimenopausal women because thyroid disease associated symptoms might mimic that of menopause¹⁶⁻¹⁸. Despite a number of research on perimenopause, there is little definitive evidence for vasomotor symptoms' influence on health-related QoL (HrQoL)¹⁹. Body mapping is defined as the procedure of generating body maps by painting, drawing or through other media and visually representing the aspects of person's lives, the participants' bodies, and their living surrounding²⁰. Body mapping is an effective tool to establish perceived health status and to promote self-assessment in identifying the health issues. The reasoning behind using body mapping is engaging the participants in critical assessment of their current signs. Nevertheless, the QoL is a primary determinant of health status, and knowing the effect of menopause on QoL is an essential component for symptomatic perimenopausal women^{21,22}. The QoL of perimenopausal women studied in different ethnic populations reported that QoL may influence the experience of menopausal symptoms^{23,24}. In India, there is a significant lack of understanding regarding the implications of menopausal symptoms in women. Hypothyroid dysfunction needs to be reflected as a crucial associating factor for menstrual abnormalities in perimenopausal women and an increased number of the world's women population suffer from menopausal transition symptoms and this issue cannot be overlooked. Very little data exists about the impact of diet on QoL among euthyroid and hypothyroid perimenopausal women in the Tamil Nadu population. On the basis of these observations, this study has aimed to assess the association between dietary patterns and QoL in perimenopausal women with euthyroid and hypothyroid disorder.

METHODS

This cross-sectional study is community-based and it consists of 96 consecutively included subjects in a selected area of Chengalpattu district, Tamil Nadu, India. This study was conducted from January 2022 to April 2022. The approval for this study was granted by our Institutional Ethics Committee (Ref: 2968/IEC/2021) of SRM Medical College Hospital & Research Centre and written informed consent was obtained from all participants prior to enrollment in the study.

A standardized questionnaire having five sets of questions was used to collect the participant's details for the study. The five sections of the questionnaire include socio-demographic details, anthropometric details, 24-hour dietary recall, Menopausal Quality of Life [MENQOL] tool and Body mapping²⁵. Sociodemographic details include name, educational level, age, occupational status and monthly income. Anthropometric measurements include height, weight and Waist-hip ratio. The 24-hour dietary recall collects data regarding previous 24-hour food and drink consumption.

MENQOL collects data regarding vasomotor, psychosocial, physical and sexual symptoms in perimenopausal women. The details regarding bodily pain symptoms are collected through the body mapping part of the questionnaire.

Inclusion and exclusion criteria

Married perimenopausal women aged between 41 and 48 years having normal and overweight BMI included in the study. The study participants have either euthyroid or hypothyroid condition. Under weight and obese subjects having BMI above 30kg/m² and below 18kg/m², with history of major chronic illnesses, such as diabetes mellitus, hypertension, other endocrinal disorders, women taking medications and supplements other than thyroid, women on hormone replacement therapy, hysterectomy patients, pregnant woman, induced menopause and premature menopausal women are excluded from the study

Description of the tool

The standardized questionnaire tool was given to all the participants and the responses were collected. Anthropometric measurements help us to identify nutritional status and the risk of future disease. All anthropometric measurements are taken using standard techniques. Weight has been measured in kg with a calibrated weighing scale and height has been recorded using stadiometer. The BMI is calculated as a measure of relative weight using the Quetelet's formula mentioned in equation 1.

Quetelet's formula,

$$BMI = \frac{\text{weight in kg}}{\text{height in m}^2} \quad (1)$$

BMI assessment is a widely applied tool which aids persons and healthcare experts in assessing and monitoring their weight and height association. Considering the prominence of BMI in the setting of health and nourishment is vital for attaining and supporting a quality life. A flexible meter tape is utilised to measure the waist circumference in a midway point between iliac crest and lowest rib. The widest point of greater trochanter is measured as hip circumference. Hip circumference is measured in the widest level on the greater trochanter. The waist-to-hip ratio (WHR) is calculated with the following formula mentioned in equation 2.

$$WHR = \frac{\text{waist circumference (cm)}}{\text{hip circumference (cm)}} \quad (2)$$

MENQOL is a standardized tool that consists of 32 individual items grouped into four domains (physical, vasomotor, sexual and psychosocial). This tool has been used in several studies²⁶⁻³⁰. In MENQOL, the severity of the symptoms is assessed using a 5-point Likert scale which has been employed in the WHOQOL questionnaire. The scoring pattern followed

was as follows: No symptoms - 0, Mild symptoms - 1, Moderate symptoms - 2, Severe symptoms - 3, Very severe symptoms - 4³¹. A 24-hour dietary recall employed in this study is a standard dietary assessment tool that consists of interview questions, which query the dietary food and drink consumption in the last 24 hours; it is assessed in 2 consecutive days and 1 non-consecutive day. The details of 24-hour dietary recall collect details regarding time of day, portion size and source of food and these details are typically collected within 15-20 minutes. For body mapping, an outline figure of a woman was provided and the participants were queried to mark the regions where the pain symptoms were experienced in the past one week after reaching menopause³².

Data Analysis

The level of dietary pattern and Menopausal QoL in euthyroid and hypothyroid perimenopausal women is evaluated using a student's t-test and differences are considered significant at $P < 0.05$. The correlation between dietary pattern and Menopausal QoL among the groups is assessed using Pearson's correlation coefficient. The distribution of demographic variables and the test significance are evaluated by the Chi-square test. The relationship between body mapping and the level of Menopausal QoL is evaluated by the Chi-square test. Overall the statistical analysis is done using the SPSS software version 21.0.

RESULTS

The level of a dietary pattern of euthyroid and hypothyroid perimenopausal women has been analyzed in Table 1.

Increased level of 18.5% good dietary pattern has been observed in euthyroid group when compared to 9.5% of hy-

pothyroid group. Nearly 78.6% of hypothyroid group have been found to be having higher level of moderate dietary pattern compared to 70.4% of euthyroid group. About 11.9% of hypothyroid group have been found to be having poor level of dietary pattern compared to 11.1% of euthyroid group. The level of normal Menopausal QoL in euthyroid group and hypothyroid group has been found to be 41.7% and 14.7%, respectively. About 70.8% of euthyroid group has been having higher level of average Menopausal QoL compared to 61.8% of hypothyroid group. Almost 47.1% of hypothyroid women and none of the euthyroid women have a moderate Menopausal QoL (Table 1).

Table 2 indicates the vasomotor domains such as hot flushes, night sweats and sweating were increased in hypothyroid women (38.1%) compared to euthyroid women (35.2%). The psychosocial domains such as feeling anxious (52.4%), poor memory (14.3%), being impatient (26.2%) and feeling depressed (61.9%) among hypothyroid women have been found to be higher than euthyroid group. The physical domains such as dry skin (38.1%), changes in tone of skin (88.1%) and low back ache (40.5%) have been found to be higher in hypothyroid women than in euthyroid women. The percentage of sexual domains such as vaginal dryness (85.7%) has also been found to be greater in hypothyroid women compared to euthyroid women (81.5%).

Demographic variables, "Age, educational status, monthly income, occupation, number of children, type of delivery, age at menarche, food type" and the level of Menopausal QoL in euthyroid and hypothyroid perimenopausal women have been shown in Table 3.

The number of respondents in euthyroid group and hypothyroid group suffering from different pain symptoms such as back ache, knee pain, leg pain and neck pain in

Table 1. The level of dietary pattern and Menopausal QoL in euthyroid and hypothyroid group

S. No	Variables		Euthyroid group		Hypothyroid group	
			Number	Percentage	Number	Percentage
1	Dietary pattern	Poor	6	11.10%	5	11.90%
		Moderate	38	70.40%	33	78.60%
		Good	10	18.50%	4	9.50%
2	Menopausal QoL	Normal	20	41.70%	5	14.70%
		Average	34	70.80%	21	61.80%
		Moderate	0	0.00%	16	47.10%

Poor: Unhealthy food intake.

Moderate: The avoidance of excess food.

Good: Healthy foods across all food groups.

Table 2. Menopausal QoL symptoms in euthyroid and hypothyroid women

S. No.	Domain	Symptoms	Euthyroid group				Hypothyroid group			
			Present		Absent		Present		Absent	
			No.	%	No.	%	No.	%	No.	%
1	Vasomotor	Hot flushes	19	35.20%	35	64.80%	16	38.10%	26	61.90%
		Night sweats	19	35.20%	35	64.80%	16	38.10%	26	61.90%
		Sweating	19	35.20%	35	64.80%	16	38.10%	26	61.90%
2	Psychosocial Symptoms	Dissatisfaction with my personal life	41	75.90%	13	24.10%	31	73.80%	11	26.20%
		Feeling anxious	26	48.10%	28	51.90%	22	52.40%	20	47.60%
		Poor memory	7	13.00%	47	87.00%	6	14.30%	36	85.70%
		Accomplishing less than I used to	54	100.00%	0	0.00%	42	100.00%	0	0.00%
		Feeling depressed	33	61.10%	21	38.90%	26	61.90%	16	38.10%
		Being impatient	14	25.90%	40	74.10%	11	26.20%	31	73.80%
		Feelings of wanting	41	75.90%	13	24.10%	31	73.80%	11	26.20%
3	Physical Symptoms	Flatulence	54	100.00%	0	0.00%	42	100.00%	0	0.00%
		Aching In muscles and joints	20	37.00%	34	63.00%	12	28.60%	30	71.40%
		Feeling tired	0	0.00%	54	100.00%	0	0.00%	42	100.00%
		Difficulty sleeping	54	100.00%	0	0.00%	42	100.00%	0	0.00%
		Aches in back of neck	54	100.00%	0	0.00%	42	100.00%	0	0.00%
		Decrease in physical strength	20	37.00%	34	63.00%	12	28.60%	30	71.40%
		Decrease in stamina	20	37.00%	34	63.00%	12	28.60%	30	71.40%
		Lack of energy	20	37.00%	34	63.00%	12	28.60%	30	71.40%
		Dry skin	16	29.60%	38	70.40%	16	38.10%	26	61.90%
		Weight gain	0	0.00%	54	100.00%	0	0.00%	42	100.00%
		Increased facial hair	54	100.00%	0	0.00%	42	100.00%	0	0.00%
		Changes in tone of my skin	39	72.20%	15	27.80%	37	88.10%	5	11.90%
		Feeling bloated	54	100.00%	0	0.00%	42	100.00%	0	0.00%
		Low backache	20	37.00%	34	63.00%	17	40.50%	25	59.50%
		Frequent urination	0	0.00%	54	100.00%	0	0.00%	42	100.00%
Involuntary urination	54	100.00%	0	0.00%	42	100.00%	0	0.00%		
4	Sexual Symptoms	Decrease in sexual desire	54	100.00%	0	0.00%	42	100.00%	0	0.00%
		Vaginal dryness	44	81.50%	10	18.50%	36	85.70%	6	14.30%
		Avoiding intimacy	54	100.00%	0	0.00%	42	100.00%	0	0.00%

Table 3. Distribution of demographic variables on the basis of level of Menopausal QoL among euthyroid and hypothyroid perimenopausal women

Demographic Variables		Level of Menopausal QoL (Euthyroid group)				Level of Menopausal QoL (Hypothyroid group)			
		Symptoms				Symptoms			
		Normal	Mild	Moderate	P value	Normal	Mild	Moderate	P value
Age (in Years)	41-44	9	23	0	0.1	3	11	7	0.78
	45-48	11	11	0		2	10	9	
Educational Status	Diploma	2	5	0	0.75	0	0	0	0.672
	Graduate	16	26	0		5	18	14	
	Post Graduate	2	3	0		0	3	2	
Occupation	Accountant	2	4	0	0.87	1	1	3	0.359
	Lab technician	3	4	0		0	0	0	
	Teacher	15	26	0		4	20	13	
Monthly Income (Rs)	15000-19999	4	5	0	0.71	0	1	1	0.93
	20000-24999	12	21	0		4	14	13	
	25000-29999	4	8	0		1	6	2	
No of children	One	1	4	0	0.7	0	3	2	0.591
	Two	18	28	0		5	18	14	
	Three	1	2	0		0	0	0	
Type of delivery	Caesarean	4	8	0	0.59	0	3	1	0.528
	Normal	16	26	0		5	18	15	
Age at Menarche	11 years	3	8	0	0.42	0	6	4	0.593
	12 years	13	21	0		5	14	11	
	13 years	4	5	0		0	1	1	
Food Type	Non-Vegetarian	15	30	0	0.21	4	17	15	0.505
	Vegetarian	5	4	0		1	4	1	

* Significant if $P < 0.05$.

body mapping has been depicted in Figure 1. Overall in the hypothyroid group, the perimenopausal women have been associated with high knee pain (38.1%), back ache (35.7%) and leg pain (9.5%) compared to euthyroid group. Similarly, in the euthyroid group, the perimenopausal women have been associated with high neck pain (37.0%) compared to hypothyroid group.

No significant association between "body mapping" and "Menopausal QoL" has been observed between euthyroid and hypothyroid perimenopausal women (Table 4, Figure 1).

The correlation between dietary pattern and Menopausal QoL between euthyroid and hypothyroid group perimenopausal women has been depicted in Table 5. The relationship between

Table 4. Association between body mapping and Menopausal QoL in euthyroid and hypothyroid perimenopausal women

Body mapping	Menopausal QoL (Euthyroid group)			P value	Menopausal QoL (Hypothyroid group)			P value
	Symptoms				Symptoms			
	Normal	Mild	Moderate		Normal	Mild	Moderate	
Back ache	7	5	0	0.348	0	8	7	0.468
Knee pain	6	12	0		3	7	6	
Leg pain	1	3	0		1	3	0	
Neck pain	6	14	0		1	3	3	

*Significant if P < 0.05.

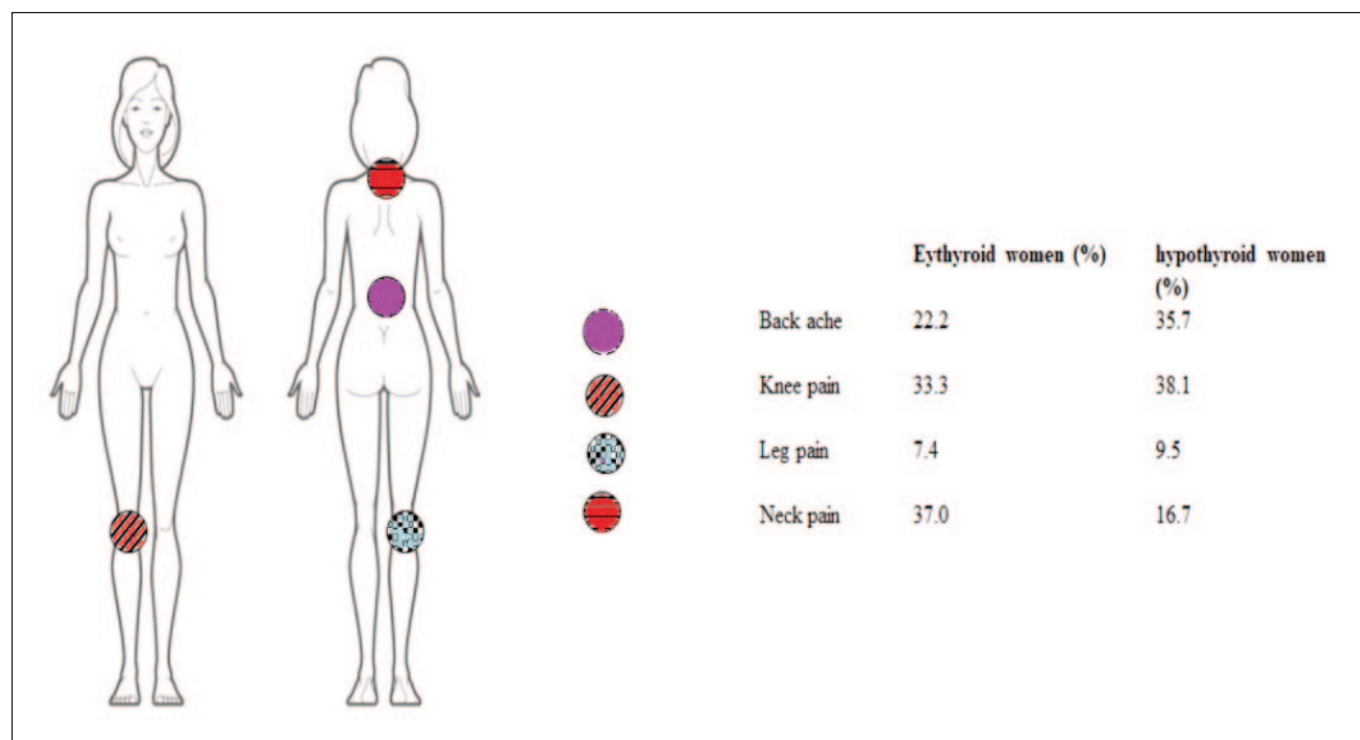


Figure 1. Body mapping of euthyroid and hypothyroid perimenopausal women

Table 5. Correlation between dietary pattern and Menopausal QoL among euthyroid and hypothyroid perimenopausal women

S. No.	Group	Variables	N	Mean	SD	R Value	P value
1	Euthyroid women	Dietary pattern	54	22.60	0.792	-0.058	0.697
		Menopausal QoL	54	2.66	0.631		
2	Hypothyroid women	Dietary pattern	42	22.15	1.077	0.468	0.005**
		Menopausal QoL	42	3.34	0.871		

** - Significant if P < 0.01; * - Significant if P < 0.05.

the dietary pattern and Menopausal QoL in hypothyroid perimenopausal women is positive (0.468) and the test is significant ($P < 0.005$).

DISCUSSION

According to the present study, the euthyroid perimenopausal women group has a good level of dietary pattern, as they are consuming a balanced diet consisting of five food groups daily. However, the level of dietary patterns of hypothyroid perimenopausal women is found to be poor due to a lack of a balanced diet. An unbalanced diet increases or decreases the thyroid-stimulating hormone level in the blood. These findings are consistent with previously reported cohort studies on the association between menopausal symptoms and dietary patterns. The previous study showed that greater adherence to fruits, the Mediterranean dietary pattern and cooked vegetables as well as less adherence to the high-sugar or high-fat dietary pattern reduced the risk of hot flashes and night sweats³³. Due to their anti-inflammatory and antioxidant properties, the collaborative consumption of the Mediterranean diet is a suitable nutrition pattern for menopausal women³⁴. Another study indicates that a higher Mediterranean diet adherence with increased intake of whole-grain cereals, pulses, whole dairy products, fruits, nuts, olive oil and a lower intake of sweetened beverages were related to lower fat mass³⁵.

In this study, the level of Menopausal QoL of euthyroid perimenopausal women is normal, as they are following healthy lifestyle and dietary pattern. But in the case of hypothyroid perimenopausal women, the level of Menopausal QoL was abnormal due to their poor lifestyle and dietary pattern. Slopien, R et al.¹⁴ has indicated that due to some subclinical pituitary secretion dysregulation during the perimenopausal period, there is a significant reduction in the level of estrogen hormone which leads to increase in the gonadotropin secretion and slightly higher amounts of TSH¹⁴. The lowering of estrogen level during the menopausal transition is associated with increase in fat mass (FM) and loss of lean body mass (LBM) which affects the QoL^{36,37}.

According to this study there is a significant relationship between Menopausal QoL and the dietary pattern among hypothyroid perimenopausal women. Eating habits are particularly substantial among the various areas of lifestyle adaptation and health promotion among perimenopausal period since they have influence on all women in terms of longevity and QoL³⁷. Higher adherence to Western dietary patterns (e.g., rich in red meat, pizza, salad dressing and dairy products and low in legumes, fruits, skimmed milk, tomatoes and cruciferous vegetables) are associated with increase of common carotid artery intima-media thickness. The study results are consistent with similar study of Abedzadeh Kalarhoudi et al.³⁸ in which the conclusions showed that religion, socioeconomic and marital status did not have any relationship with QoL among menopausal women.

According to the body mapping results, all the respondents in euthyroid group and hypothyroid group are suffering from different pain symptoms such as back ache, knee pain, leg pain and neck pain. Under physical domain, the pre-dominant complaints among hypothyroid perimenopausal women are knee pain and back ache. Similarly, the euthyroid perimenopausal women are mainly suffering from neck pain and knee pain. The similar result has been noted in the comparative study by Surendar R et al, in which joint pain followed by back pain was noted among perimenopausal women³⁹. The present study has showed the most common symptoms prevailing among perimenopausal women are muscular and joint symptoms followed by night sweats and hot flushes which is similar to the study by Sagdeo et al⁴⁰. In the present study, there is no significant association between Menopausal QoL and body mapping among euthyroid and hypothyroid perimenopausal women. This is consistent with the previous study among post and peri-menopausal women conducted among Amritsar area's rural women using a menopausal rating scale which showed that the most prevailing symptoms were headache (88.8%), feeling tired (92.90%), sleeplessness (54.40%), muscular and joint and discomfort (76.20%), mental and physical exhaustion (60.1%)⁴¹.

CONCLUSION

The present study concludes that there is a positive relationship between the dietary pattern and Menopausal QoL in hypothyroid perimenopausal women. Hence, hypothyroid dysfunction should be considered as an important related factor for menstrual abnormalities in perimenopausal women which affects their Menopausal QoL. The restoration of hypothyroidism in premenopausal women can improve their Menopausal QoL. This can be achieved by consuming balanced diet and practicing proper lifestyle habits. The present study also insists that there is a need of creating awareness among the perimenopausal women about the association between dietary pattern and the Menopausal QoL. The perimenopausal women should be insisted to practice a greater adherence to the Mediterranean diet and lesser adherence to the Western diet.

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