ASSOCIATION OF DIETARY INTAKE WITH HEALTH-RELATED QUALITY OF LIFE IN POSTMENOPAUSAL WOMEN

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ABSTRACT

BACKGROUD: *Menopausal symptoms can significantly affect the quality of life in postmenopausal women. Understanding the relationships between dietary intake, anthropometric measurements, and health-related quality of life can inform effective health interventions. This study aims to explore the associations between anthropometric measurements, dietary intake, and health-related quality of life in postmenopausal women.*
METHOD: *A cross-sectional study was conducted with 200 postmenopausal women aged 45 to 65 years in Mumbai. Data was collected through structured interviews, including demographic details, anthropometric measurements, the Menopause Rating Scale, dietary patterns using a Food Frequency Questionnaire and 24-hour dietary recalls, and health-related quality of life measured by the WHOQOL-BREF. Statistical analyses included descriptive statistics, ANOVA, and Pearson correlation coefficients.*
RESULT: *This study examined the relationships between anthropometric measurements, dietary intake, and health-related quality of life (HRQOL) in postmenopausal women. The result indicated that 46.5% of participants experienced moderate symptoms, while 41.5% reported severe symptoms. Higher BMI and weight were linked to more severe symptoms. Nutrient intake analysis revealed trends of increased energy, carbohydrate, protein, and fiber intake with symptom severity. HRQOL analysis indicated significant differences in social relationship scores among symptom severity groups ($p = 0.034$), with milder symptoms associated with better social relationships. Correlations showed positive associations between weight and both energy and fat intake, and a strong positive correlation between BMI and fat intake. Higher energy and protein intakes were linked to better physical health outcomes. These findings suggest potential dietary and health trends in postmenopausal women, warranting further research to confirm these associations and understand their implications.*
CONCLUSION: *Dietary intake may influence symptom severity and HRQOL in postmenopausal women. Higher energy, carbohydrate, and fiber intakes were associated with more severe menopausal symptoms, and higher BMI was linked to poorer physical health. Additionally, higher energy and protein intakes showed weak associations with better physical health outcomes. These findings suggest potential dietary and health trends among postmenopausal women, indicating the need for further research to confirm these associations and understand their implications.*

Keyword: - *Menopausal symptoms, Postmenopausal women, Health-related quality of life, Dietary intake, Anthropometric measurements.*

1. INTRODUCTION

Postmenopausal women represent a unique demographic with specific health considerations that significantly impact their quality of life. The STRAW (Stages of Reproductive Aging Workshop) classification defines post menopause as the period following the last menstrual period (LMP), characterized by the absence of menstrual cycles for at least 12 months [1]. This natural transition brings numerous hormonal changes that can profoundly affect various aspects of health and well-being, necessitating targeted interventions to improve quality of life. Understanding the interplay between hormonal changes, dietary patterns, and health-related quality of life is crucial

for enhancing the well-being of postmenopausal women. Research has shown that menopausal symptoms, influenced by factors such as age, education, and physical activity, can lead to a decline in health-related quality of life [2]. Dietary patterns, in particular, play a significant role in health outcomes, with studies indicating that healthy diets rich in vegetables, proteins, and whole grains can reduce risks of chronic conditions like metabolic syndrome and osteoporosis [3,4]. By comprehensively addressing these factors, healthcare professionals can develop effective strategies to improve the overall health and quality of life for postmenopausal women.

This study aims to investigate the relationship between dietary intake and health-related quality of life among postmenopausal women. By assessing anthropometric measures, dietary intake, and evaluating health-related quality of life, this research seeks to elucidate the associations between dietary patterns and quality of life. This research highlights the importance of dietary interventions in enhancing the well-being of postmenopausal women during this transformative phase of life.

1.1 The Significance of Quality of Life in Postmenopausal Women

Health-related quality of life (HRQOL) in postmenopausal women significantly impacts their overall well-being. Menopausal symptoms play a critical role in this demographic, affecting productivity and economic outcomes [5]. Early intervention within five years of menopause is crucial for mitigating symptom severity and enhancing quality of life [6]. Factors such as the severity and duration of symptoms, reproductive history, and socioeconomic status intricately influence quality of life [7]. Effective symptom management is essential for improving HRQOL [2]. Sociodemographic determinants, including age, education, occupation, marital status, income, menopausal status, and symptom severity, also shape quality of life, necessitating tailored interventions to address these factors [8]. By recognizing these determinants and implementing targeted interventions, postmenopausal women can navigate this transformative phase with improved well-being and resilience.

1.2 Dietary Patterns and Postmenopausal Women's Health

Dietary patterns significantly affect the health outcomes of postmenopausal women. Research highlights the correlation between healthy dietary patterns and reduced risks of metabolic syndrome, with diets rich in green-yellow vegetables, proteins, seaweeds, and bonefish showing promise in mitigating these risks [3]. The Mediterranean diet, associated with delayed menopause onset and alleviation of symptoms, underscores the potential benefits of dietary interventions for reproductive health [9]. Nutrition also plays a pivotal role in mitigating chronic disease risks prevalent among postmenopausal women, including osteoporosis and breast cancer. Evidence supports the critical role of nutrition in fostering bone health and reducing cancer susceptibility [4,10]. Furthermore, dietary choices impact reproductive health outcomes, with healthy dietary patterns linked to delayed menopause and improved bone health and body composition [11,4]. These findings underscore the importance of nutrition in promoting the holistic well-being of postmenopausal women, emphasizing dietary interventions to optimize health outcomes during this life stage.

1.3 Effect of Dietary Intake on Quality of Life in Postmenopausal Women

Dietary intake profoundly influences the quality of life and health outcomes in postmenopausal women as they navigate hormonal and metabolic changes. Research consistently highlights deficiencies in essential macronutrients and micronutrients among this population, alongside inadequate consumption of fruits, vegetables, whole grains, and low-fat dairy products [12]. These dietary patterns increase risks for chronic diseases such as cardiovascular disease and osteoporosis, emphasizing the need for attention to nutritional needs. Higher-quality diets, rich in fiber, fruits, and vegetables, have been linked to improved body composition and cardiovascular health [3]. The Mediterranean diet, with its emphasis on plant-based foods and healthy fats, offers a promising approach [13]. Enhancing dietary intake by increasing consumption of nutrient-dense foods, such as fruits, vegetables, whole grains, legumes, nuts, seeds, and low-fat dairy products, while reducing intake of red and processed meats, added sugars, and salt, is crucial for improving the quality of life and reducing chronic disease risks in postmenopausal women [13]. By adopting healthier eating habits, postmenopausal women can elevate their quality of life, decrease susceptibility to chronic diseases, and achieve better health outcomes during this transformative phase of life.

2. METHODOLOGY

This cross-sectional study included 200 postmenopausal women aged 45 to 65 years residing in Mumbai excluding participants with a history of eating disorders oe use of medications or treatments affecting dietary habits. Participants were recruited through snowball sampling. The participants were informed about the study, its design and the purpose of the study. Ethical clearance was obtained from the Intersystem Biomedica Ethics Committee (ISBEC). Data was collected using structured interviews, including demographic details, anthropometric measurements (height, weight, BMI), postmenopausal status assessed with the Menopause Rating Scale (MRS), dietary patterns evaluated through a Food Frequency Questionnaire (FFQ) and 24-hour dietary recalls, and quality of life measured using the WHO Quality of Life Questionnaire-Brief (WHOQOL-BREF).

2.1 Statistical Analysis

Descriptive statistics, including mean, frequency, median, and standard deviation, were employed to analyze sociodemographic variables and anthropometric measurements. Differences among varying severities of menopausal symptoms were assessed using ANOVA. Pearson correlation coefficient was utilized to explore relationships between variables. The results are presented in the form of tables and figures.

3. RESULT AND DISCUSSION

Table -1: Demographic Details of Study Participants

Demographic Factors	Frequency (n)	Percentage (%)
Age (in years)		
45-50	27	13.5
50-55	65	32.5
55-60	66	33
60-65	42	21
Educational Background		
Primary School	17	8.5
Secondary School	57	28.5
High School Diploma	39	19.5
Bachelor's Degree	84	42
Master’s Degree	3	1.5
Doctorate/Ph.D.	17	8.5
Employment Status		
Employed full-time	16	8
Employed part-time	36	18
Unemployed	1	0.5
Retired	2	1
Homemaker	145	72.5
Monthly Family Income		
<₹10,000	5	2.5
₹11,000 - ₹20,000	5	2.5
₹21,000 - ₹50,000	51	25.5
>₹51,000	139	69.5

Table 1 shows that majority of participants were aged 55-60 (33%), followed closely by those aged 50-55 (32.5%). Most had a Bachelor's degree (42%), with 28.5% having completed secondary school. The predominant employment status was homemaking (72.5%), followed by part-time employment (18%). Additionally, a significant portion of the participants had a family monthly income exceeding ₹51,000 (69.5%).

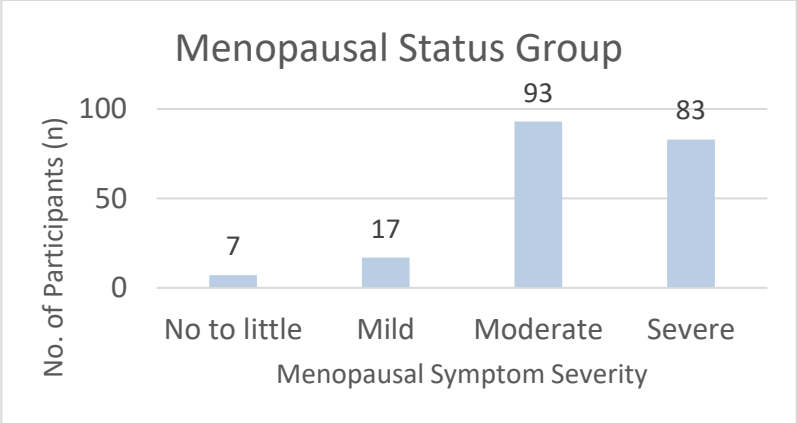

Chart -1: Menopausal Symptoms Group
(According to the Menopause Rating Scale)

Chart 1 shows the distribution of participants based on the severity of menopausal symptoms, as measured by the Menopause Rating Scale (MRS). Participants were divided into four groups: the "No to little symptoms" group (scores 0-4) included 7 participants (3.5%), the "Mild symptoms" group (scores 5-8) comprised 17 participants (8.5%), the "Moderate symptoms" group (scores 9-16) included 93 participants (46.5%), and the "Severe symptoms" group (scores 17 or higher) had 83 participants (41.5%).

3.1 Anthropometric Measurements of the Study Sample

Table 2: Anthropometric Measurements of the Study Sample According to the Severity of Menopausal Symptoms

Anthropometric Measurements	Severity of Menopausal Symptoms				F value	p-value
	No to little (n=7) (Mean ± SD)	Mild (n=17) (Mean ± SD)	Moderate (n=93) (Mean ± SD)	Severe (n=83) (Mean ± SD)		
Height (cm)	152.14 ± 14.81	154.94 ± 15.19	153.96 ± 11.31	153.11 ± 13.33	0.161	0.922
Weight (kg)	65.43 ± 8.7	66.06 ± 15.8	66.83 ± 13.25	63.8 ± 12.02	0.813	0.488
BMI (kg/m2)	29.52 ± 10.61	27.41 ± 4.79	28.75 ± 7.75	27.74 ± 7.04	0.415	0.742
Underweight	-	-	17.49 ± 1.11	17.23 ± 0.73	0.09	0.99
Normal weight	23.17 ± 0.77	22.77 ± 1.75	22.28 ± 1.89	22.14 ± 1.70		
Overweight	28.08 ± 0.97	27.48 ± 1.64	27.11 ± 1.51	27.41 ± 1.54		
Obese Class I	-	32.27 ± 1.63	31.90 ± 1.51	32.11 ± 1.64		
Obese Class II	-	35.25 ± 0.0	36.96 ± 1.84	36.00 ± 0.62		
Obese Class III	52.88 ± 0.0	-	48.20 ± 8.16	46.30 ± 4.75		

Mean ± Standard Deviation *p < 0.05

Table 2 illustrates the relationship between anthropometric measurements (height, weight, BMI) and the severity of menopausal symptoms. Participants were categorized based on symptom severity, with mean and standard deviation (SD) calculated for each measurement per group. Statistical analysis using the F value and p-value indicated no significant differences in height (F = 0.161, p = 0.922), weight (F = 0.813, p = 0.488), or BMI (F = 0.415, p = 0.742) across the groups. Despite the lack of significant differences, trends were observed: women with moderate (66.83) and severe symptoms (63.8) had slightly higher mean weights compared to other groups (65.43, 66.06). BMI analysis showed that higher symptom severity correlated with higher BMI, particularly in Obese Class II and III, suggesting a potential association between severe menopausal symptoms and higher BMI.

Another study revealed a notable but weak positive relationship between menopause-related symptoms and both body mass index (BMI) and body fat mass (BFM) in healthy postmenopausal women. This suggests that women with higher BMI and BFM may experience more severe menopause-related symptoms. Studies indicate a link between lifestyle factors, such as nutrition and BMI, and the severity of menopausal symptoms. It is suggested that

fluctuations in estrogen levels and changes in body fat distribution during menopause may contribute to increased total body fat and central fat mass [14].

3.2 Nutrient Intakes of the Study Sample

The mean values of macronutrients such as energy, protein, carbohydrate, fat and fiber were computed.

Table 3: Distribution Of Energy, Protein, Carbohydrate, Fat, Fiber according to Menopausal Symptoms

Nutrients	Severity of Menopausal Symptoms				F value	p-value
	No to little (n=7) (Mean ± SD)	Mild (n=17) (Mean ± SD)	Moderate (n=93) (Mean ± SD)	Severe (n=83) (Mean ± SD)		
Energy (kcal)	1224.1± 202.9	1333.23 ± 337.35	1313.4 ± 245.7	1353.1 ± 284.62	0.680	0.566
RDA% Energy	73.74	80.31	79.11	81.51		
Carbohydrate (g)	155.21 ± 39.66	171.43 ± 54.4	168.77 ± 37.71	177.47 ± 43.86	1.025	0.382
RDA% Carbohydrate	119.39	131.86	129.82	136.51		
Protein (g)	41.3 ± 5.56	47.03 ± 12	43.57 ± 10.69	46.02 ± 11.6	1.167	0.324
RDA% Protein	90.37	102.9	95.33	100.7		
Fat (g)	46.73 ± 12.18	49.33 ± 13.96	49.38 ± 11.83	48.35 ± 12.83	0.191	0.902
RDA% Fat	155.7	164.43	164.6	161.16		
Fiber (g)	19.82 ± 10.68	23.16 ± 7.44	22.91 ± 6.99	25.13 ± 7.82	0.313	0.816
RDA% Fiber	66.06	77.16	76.36	83.76		

Mean ± Standard Deviation *p < 0.05

Table 3 analyzes nutrient intake among women with different severities of menopausal symptoms, revealing some non-significant trends. Mean energy intake increased from 1224.15 kcal in the "No to little" group to 1353.10 kcal in the "Severe" group, and mean carbohydrate intake rose from 155.21 g to 177.47 g between these groups. Protein intake showed a slight increase from 41.3 g to 46.02 g, with the "Severe" group consuming the most, though not significantly more than other groups. Fat intake did not show a clear trend, while fiber intake increased from 19.82 g to 25.13 g with severity. High carbohydrate and fat intake was attributed to foods high in cereals, grains, and simple carbohydrates, along with visible fats. These findings suggest that nutrient intake trends with symptom severity were observed but were not statistically significant, indicating that dietary patterns might not significantly vary with menopausal symptom severity.

Previous study showed that a dietary intervention involving a reduced-fat vegan diet and daily soybeans led to an 88% reduction in moderate-to-severe vasomotor symptoms in postmenopausal women compared to a control group. This intervention also resulted in greater reductions in other menopausal symptoms, including physical and sexual symptoms [15]. Another study revealed that higher scores on the Dietary Inflammatory Index (DII) and Food-based Dietary Inflammatory Index (FDII) were associated with more severe sexual symptoms during menopause. Following an anti-inflammatory diet may improve quality of life and reduce menopausal symptoms, particularly those related to sexual function [16]. Additionally, research has shown that poor dietary habits, such as low intake of fruits, vegetables, and healthy whole grains, coupled with high intake of refined carbohydrates, saturated fats, and sugary foods, are associated with more severe menopausal symptoms. Early nutritional education is crucial, as these poor dietary habits may persist into the menopausal stage [17]. In summary, adopting healthy, anti- inflammatory diet rich in plant-based foods like vegetables, fruits, whole grains, and soy may help reduce the severity of menopausal symptoms. Conversely, a diet high in processed, inflammatory foods may exacerbate symptoms. These findings highlight the importance of dietary changes in managing menopausal symptoms.

3.3 Health-Related Quality of Life of the Study Sample

Table 4: Health-Related Quality of Life of the Study Sample According to the Menopausal Symptoms

	Total (200) (Mean ± SD)	Menopausal Symptoms				F value	p-value
		No to little (n=7) (Mean ± SD)	Mild (n=17) (Mean ± SD)	Moderate (n=93) (Mean ± SD)	Severe (n=83) (Mean ± SD)		
Physical Health	53.39 ± 10.68	57.66 ± 9.54	56.5 ± 9.47	54.07 ± 10.11	51.63 ± 11.43	1.746	0.159
Psychological Health	53.92 ± 9.46	56.56 ± 5.82	56.13 ± 5.54	53.76 ± 9.34	53.42 ± 10.44	0.574	0.632
Social Relationship	72.5 ± 19.97	92.86 ± 12.54	76.47 ± 22.62	71.51 ± 18.94	71.08 ± 20.3	2.949	**0.034***
Environmental Health	55.92 ± 11.59	60.29 ± 6.92	58.09 ± 13.54	55.56 ± 11.83	55.51 ± 11.27	0.596	0.618
Overall QOL	55.55 ± 9.48	61.14 ± 5.95	58.14 ± 9.05	55.45 ± 9.24	54.66 ± 9.95	1.496	0.217

Table 4 examines the relationship between the severity of menopausal symptoms and health-related quality of life (HRQOL) in postmenopausal women, revealing a significant difference in social relationship scores ($p = 0.034$). Women with "Mild" and "No to Little" symptoms had higher mean social relationship scores than those with "Moderate" and "Severe" symptoms, indicating better social relationships in women with milder symptoms. For other HRQOL domains and overall quality of life, the highest mean scores were in the "Mild Menopausal Symptoms" group. Although these differences were not statistically significant, the trends suggest a potential decline in physical, psychological, and environmental health, as well as overall quality of life, with increasing symptom severity. This indicates that women with milder menopausal symptoms generally report higher HRQOL across various domains compared to those with more severe symptoms.

Multiple studies have consistently demonstrated an inverse relationship between the severity of menopausal symptoms and the quality of life (QoL) among women. For instance, research indicates that quality of life (QoL) in postmenopausal women is inversely related to the severity of menopausal symptoms, with each unit increase in the Menopause Rating Scale (MRS) score resulting in a 0.420 unit decrease in total QoL score [7]. Estimates suggest that 50 to 80% of women experience menopausal symptoms, both physical and psychological, which can significantly degrade their QoL [18]. Additionally, severe symptoms such as hot flushes, memory issues, dissatisfaction with personal life, low backache, and changes in sexual desire have been shown to markedly impact QoL, emphasizing the need for effective management strategies to enhance well-being during menopause [19].

3.4 Association Between Anthropometric, Dietary Intake with Health-Related Quality of Life of the Study Participants.

Table 5: Association of Anthropometric Measurements with Dietary Intake and Health-Related Quality of Life

Variables	Height (cm)		Weight (kg)		BMI (kg/m2)	
	r value	p- value	r value	p- value	r value	p- value
Dietary Intake						
Energy (kcal)	-0.134	0.059	0.027	0.703	0.119	0.094
Protein (g)	-0.040	0.575	-0.004	0.958	0.022	0.754
Carbohydrate (g)	-0.106	0.135	-0.081	0.256	0.008	0.913
Fat (g)	**-0.159***	**0.024***	0.102	0.149	**0.200****	**0.004***
Fiber (g)	0.050	0.485	-0.116	0.103	-0.107	0.130
Health-Related Quality of Life						
Physical Health	-0.103	0.148	0.095	0.181	**-0.161***	**0.022***
Psychological Health	0.010	0.884	0.075	0.291	0.068	0.338
Social Relationship	-0.030	0.676	0.111	0.116	0.121	0.088
Environmental Health	-0.055	0.442	0.043	0.544	0.096	0.178
Overall QOL	-0.059	0.404	0.096	0.176	0.139	0.050

Table 5 explores the relationships between height, weight, BMI, and various health-related factors such as sleep quality, dietary intake, and quality of life (QOL) in postmenopausal women using Pearson's correlation coefficient. Although many correlations were not statistically significant, some trends emerged. Weight showed a weak positive correlation with energy intake, suggesting that heavier women might consume more calories. Similarly, there was a weak positive correlation between weight and fat intake, indicating that higher weight might be associated with

greater fat consumption, though this was not statistically significant. Notably, BMI showed a strong positive correlation with fat intake, suggesting that women with higher BMI tend to consume more fat, and this trend was statistically significant. No significant correlations were found between anthropometric measures and psychological, social, or environmental health QOL, indicating that factors other than height, weight, or BMI might influence these aspects of QOL. However, a moderate negative correlation was observed between BMI and physical health, indicating that increased BMI might be associated with poorer physical health, potentially due to differences in body composition or related factors.

Previous research has found that 42.1% of postmenopausal women were classified as obese, a condition linked to reduced physical activity, unhealthy dietary habits, age-related decreases in basal metabolic rate, and lower energy expenditure. Additionally, diet quality was highlighted as crucial for metabolic health, with higher Healthy Eating Index scores correlating with better body composition and lipoprotein profiles. Obesity, defined as a BMI over 30 kg/m², was associated with poorer health-related quality of life (HRQL), particularly in physical functioning, energy, and health perceptions, and also with the severity of vasomotor symptoms and physical issues, negatively impacting daily activities and overall QoL [20,21].

Table 6: Association of Nutrient Intake with Health-Related Quality of Life

Variables	Energy (kcal)		Protein (g)		Carbohydrate (g)		Fat (g)		Fiber (g)	
	r value	p- value	r value	p- value	r value	p- value	r value	p- value	r value	p- value
Physical Health	-0.048	0.501	0.040	0.576	-0.041	0.566	0.010	0.893	-0.009	0.894
Psychological Health	-0.029	0.683	-0.046	0.517	0.002	0.981	-0.012	0.864	-0.009	0.904
Social Relationship	0.020	0.775	-0.050	0.486	-0.041	0.566	0.108	0.127	-0.016	0.824
Environmental Health	-0.021	0.771	-0.042	0.552	-0.027	0.700	0.051	0.477	-0.082	0.246
Overall QOL	-0.033	0.643	-0.059	0.410	-0.043	0.549	0.049	0.488	-0.053	0.454

Table 6 examines the relationships between dietary intake and health-related quality of life (QOL) in postmenopausal women using Pearson's correlation coefficient. Although no statistically significant correlations were found between dietary factors (energy, protein, carbohydrate, fat, fiber) and overall QOL, some trends emerged. Higher energy intake showed a weak negative correlation with all health categories, with a significant correlation with physical health ($p = 0.048$), suggesting that higher energy intake might be linked to better physical health. Protein intake displayed a weak negative correlation with all health categories except social health. Carbohydrate intake also showed a weak negative correlation with all health categories, though none were significant. Fat intake exhibited a weak positive correlation with most health categories, except psychological health. Fiber intake showed a weak negative correlation with most health categories. These trends imply that higher intakes of energy, protein, carbohydrate, and fiber might be associated with better health outcomes, whereas fat intake might have a minor positive association with health.

The findings of this study underscore the significant impact of nutrient intake on the health-related quality of life (HRQOL) among postmenopausal women. Our results reveal that higher consumption of energy, carbohydrates, protein, fats, and fiber is associated with improved HRQOL scores, highlighting the importance of a well-balanced diet for overall well-being in this demographic. Protein intake plays a crucial role in maintaining muscular strength and function, particularly in older adults, while n-3 and n-6 fatty acids possess anti-inflammatory properties that can enhance mobility and overall health [22]. Furthermore, a focus on dietary fiber has been shown to benefit postmenopausal African American women with obesity, resulting in a better metabolic profile and reduced risk of metabolic syndrome [23]. Similarly, studies advocating for low-fat, plant-based diets in postmenopausal women have demonstrated positive effects on body composition and cardiovascular risk markers [24]. Additionally, research on energy-restricted diets in this population has shown significant effects on body weight, visceral fat loss, and metabolic health [3]. These findings underscore the importance of dietary patterns in the health of postmenopausal women and highlight the potential benefits of specific nutrient intakes in enhancing their overall well-being. Studies focusing on energy, protein, carbohydrate, fiber intake, and fat intake provide valuable insights

into optimizing dietary guidelines for postmenopausal women, ultimately promoting better health outcomes and enhancing their quality of life.

4. CONCLUSION

The study explored the relationships between anthropometric measurements, dietary intake, and health-related quality of life (HRQOL) in postmenopausal women. Higher energy, carbohydrate, and fiber intakes were associated with more severe menopausal symptoms, and higher BMI was linked to poorer physical health. Additionally, higher energy and protein intakes showed weak associations with better physical health outcomes. These findings suggest potential dietary and health trends among postmenopausal women, indicating the need for further research to confirm these associations and understand their implications.

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