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Original Article

Understanding the Impact of Functional, Communicative, and Critical Health Literacy on Arthritis Prevention Behaviors Among Middle-Aged Women in Borazjan, South of Iran

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Abstract

Background: Osteoarthritis (OA) is a prevalent joint condition that significantly reduces individuals' quality of life. Effective preventive behaviors can help mitigate the occurrence of OA, and understanding the factors influencing these behaviors is crucial. Health literacy has been identified as a significant factor affecting various health outcomes; however, limited information is available regarding its association with arthritis prevention behaviors. This study aimed to assess the predictive role of functional, communicative, and critical health literacy in adopting arthritis prevention behaviors among middle-aged women.

Methods: This cross-sectional descriptive-analytical study was conducted in 2023 on a randomly selected sample of 519 women aged 30-59 years, affiliated with the Borazjan Comprehensive Healthcare Center. Data were collected using the Functional, Communicative, and Critical Health Literacy (FCCHL) questionnaire and an OA preventive behaviors survey. Data were analyzed using R version 3.3.4 through multiple regression and descriptive statistical methods. Furthermore, a significant level of $P<0.05$ was considered statistically significant.

Results: The mean age of the participants was 41.85 ± 8.01 years, ranging from 30 to 59 years. Among the health literacy dimensions, the highest and lowest average scores were assigned to critical and functional dimensions, respectively. Multiple regression analysis revealed that among the cognitive variables, joint pain ($P=0.001$, $\beta=0.106$), and among the domains of health literacy, critical health literacy ($P<0.001$, $\beta=0.258$) were significant predictors of OA preventive behaviors.

Conclusion: This study highlights the importance of considering critical health literacy levels among women and the intensity of joint pain when designing educational programs for preventing OA among middle-aged women. These findings underscore the need for targeted interventions to enhance health literacy and alleviate joint pain to promote effective arthritis prevention behaviors.

Keywords: Health literacy, Arthritis, Women

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Introduction

With the unprecedented rise in the aging population, musculoskeletal disorders and joint diseases have become some of the most prevalent health concerns in both developed and developing countries. Among these, osteoarthritis (OA) stands out as one of the most significant disorders (1-3). OA is a painful joint disease affecting over 32.5 million adults in the United States and over 350 million adults worldwide. The prevalence of OA is expected to rise continually in the coming decades, leading to substantial societal health and economic costs, as well as a negative impact on individuals' daily activities and quality of life (4). According to the available scientific evidence, about 10% of men and 18% of women suffer from OA (5).

Estimates indicate that 130 million people worldwide will suffer from OA by 2050, creating a significant social burden across different societies (6). In Iran, of every 10 patients aged 20-35 years who visit a physician with major complaints of knee, back, and neck pain, nine are diagnosed with OA (7). Several factors contribute to the development and progression of OA, including age, gender, race, genetics, sex hormones, bone density, metabolic disorders such as diabetes and obesity, poor

nutrition, joint injuries, excessive joint stress, and previous inflammatory or infectious joint conditions, increasing the risk of OA occurrence (2,7). After the age of 50, women are more likely than men to suffer from this disease, partly due to the

Evidence suggests that improving lifestyle and creating appropriate behavioral habits such as engaging in physical activity and maintaining a healthy diet can be highly effective in preventing or reducing the severity and symptoms of OA. Therefore, it is possible to significantly reduce the prevalence of this disease and its related complications by adopting and practicing a suitable and healthy lifestyle (9). Unfortunately, a study reported that only 57% of women engaged in preventive behaviors to protect against arthritis (10). According to a previous study, many middle-aged women (30.5%) did not practice proper physical activity to prevent OA, over 57% failed to consume sufficient amounts of vegetables, and more than half (51.4%) did not consume enough dairy products. Additionally, 54.8% of women do not use chairs that meet ergonomic requirements, and more than 37% do not wear proper standard shoes (10). Despite their vital role in family health management, these women seem to pay less attention to their health. Consequently, this neglect may result in inappropriate behaviors that may affect various aspects of their health (11,12).

Health literacy has become recognized as one of the main determinants of individual behavior and performance in health-related domains. Generally, health literacy refers to an individual's ability to access, understand, and use health-related information to make appropriate decisions that contribute to maintaining and promoting health (13). It is linked with the level of literacy, which comprises the individual's knowledge, motivation, and competence in accessing, understanding, evaluating, and using health information, which helps make correct judgments and take appropriate actions in their daily lives regarding health, disease prevention, and health promotion, thereby improving or maintaining their quality of life (14).

Increasing health literacy behaviors and improving access to health care are among the key benefits of health literacy (15). Health literacy encompasses a hierarchy of abilities, ranging from basic skills to advanced communication and critical thinking skills. Nutbeam introduced three specific levels of health literacy: functional, communicative, and critical. Functional health literacy refers to the basic reading and writing skills required to effectively function in a health context. Communicative or interactive health literacy is a more advanced form of literacy, involving social skills that enable a person to actively participate in healthcare, extract information, infer meaning from various forms of communication, and apply this information to change situations. Critical health literacy refers to the ability to critically analyze and utilize information to take actions that address structural barriers to health (16).

Health literacy across these three domains can be one of the most important determinants of adopting health behaviors by enhancing understanding, precision, and the ability to evaluate the benefits of diagnostic and preventive behaviors (17). Although several studies have demonstrated a relationship between health literacy and healthy behaviors (18), as well as preventive behaviors such as performing diagnostic tests and screening (19), information is limited regarding the relationship between different domains of health literacy and preventive behaviors for OA. Therefore, the present study was conducted to determine the predictive role of functional, communicative, and critical health literacy in OA preventive behaviors among middle-aged women.

Materials and Methods

This cross-sectional study, approved under the Ethics Code IR.BPUMS.REC.1402006, was conducted in 2023 on 519 middle-aged women, aged 30–50, who were covered by comprehensive healthcare centers in Borazjan, Iran. Based on Panahi et al (20), the minimum required sample size was calculated as 346. Considering the design effect, the final sample size was adjusted to 519. The sample size was determined using Equation 1 and calculated with PASS software, version 12.

The inclusion criteria for participation in the study were: being aged 30-59 years, having a health record at a comprehensive healthcare center, being literate, residing in Borazjan, and having no cognitive, perceptual, or mental health disorders as indicated in the individual's health records. The exclusion criterion was the submission of incomplete research questionnaires. Sampling for this study was conducted using a stratified method. A proportional random sample was selected from each healthcare center or stratum, based on the number of middle-aged women (aged 30–59) covered by each center, according to the determined sample size. Subsequently, the summary of their electronic medical records was reviewed by an integrated health system for eligibility assessment. Women who met the initial inclusion criteria were randomly contacted and invited to participate in the study. This process continued until the target sample size was achieved. Finally, a representative sample of women meeting all inclusion criteria was obtained, and the selected participants were enrolled in the study and completed the informed consent form.

The participants visited healthcare centers on specific days, that were coordinated by themselves. After receiving a thorough explanation regarding the study design and purpose, they completed the research questionnaires, including the demographic profile form, the Functional, Communicative, and Critical Health Literacy (FCCHL) questionnaire, and the OA preventive behavior questionnaire. The demographic information form included nine questions about the participant's age, body mass index (BMI), marital status, employment status, education level, economic status, family history of OA, the level of joint pain, and sources of health information

regarding diseases such as OA. The FCCHL questionnaire, based on Nutbeam's health literacy model and developed by Ishikawa et al in Japan, was used to evaluate women's health literacy (21). It contains five items for the functional and communicative domains and four items for the critical domain. Each item is scored on a 4-point Likert scale, ranging from "never" to "always." The scores for each domain were summed and divided by the number of questions in that domain to calculate the overall score. The minimum score is 1, while the maximum score is 4, with higher scores indicating higher health literacy among subjects. This tool has been validated in several languages worldwide and has been applied in numerous studies, with proven validity and reliability (22-24). Accordingly, Reisi et al reported internal consistency for the overall instrument and its three functional, communicative, and critical domains as 0.82, 0.91, 0.80, and 0.76, respectively (24).

A researcher-made questionnaire, adapted from the study of Norozi et al, was used to evaluate OA preventive behaviors (7). This instrument consists of 13 questions evaluating women's adherence to preventive behaviors such as stretching and strengthening exercises, consumption of dairy products and vegetables, regular weight control, use of a firm bed, use of suitable shoes, and correct sitting positions. To evaluate the validity of the questionnaire, it was reviewed by 10 experts from various fields, including medicine, orthopedics, and health education. Content validity was assessed using the content validity ratio (CVR) and content validity index (CVI). All questions received scores between 0.80 and 1.0 for clarity, relevance, and simplicity, which were considered acceptable. The total CVR score exceeded 0.62, according to the Lawshe table, while the average CVI for performance-related questions was greater than 0.99. After incorporating experts' qualitative feedback on grammar, word choice, and item placement, the final version of the questionnaire was prepared for reliability testing. The reliability of the questionnaire was confirmed with a Cronbach's alpha coefficient of 0.93, indicating strong internal consistency.

The collected data were analyzed using R version 3.3.4. For quantitative variables, mean and standard deviation were used, while frequency and percentage were applied to qualitative variables. Data analysis included independent t-tests, ANOVA, correlation coefficients, and multiple linear regression models. A P value of 0.05 was considered statistically significant.

Results

In this study, 519 out of 533 middle-aged women who met the inclusion criteria agreed to participate. The mean age of the participants was 41.85 ± 8.01 years, ranging from 30 to 59 years. The majority of participants (81.7%) were married, and 70.5% were housewives. Most of the participants (42%) had a university education, and more than half (51%) reported their economic status as average. Additionally, 33% of middle-aged women reported a family history of OA, and 25% had visited a physician for an early diagnosis of OA. The mean joint pain score among middle-aged women was 3.83 ± 3.27, while their average BMI was 27.35 ± 4.29. Regarding the most important source of information about OA disease, 31% stated that they had no information source, 27% obtained related information from doctors, 13% from the Internet, and 11% from healthcare providers in health centers. Comprehensive information was also obtained from television (6%), from books (4%), from people with OA (3.5%), from acquaintances and friends (2%), from magazines (2%), from face-to-face training (2%), and from radio (1%).

The mean total health literacy score of middle-aged women in the study was 3.23 ± 0.50, with the minimum and maximum health literacy scores being 1.5 and 4, respectively. The mean score for health literacy was estimated as 3.128 ± 0.74 for the functional dimension, 2.60 ± 0.57 for the communicative domain, and 3.31 ± 0.67 for the critical dimension (Table 1).

The mean score for preventive behaviors against OA in the study subjects was 8.75 ± 2.40. Regarding specific preventive behaviors against OA, 47.6% of participants did not engage in proper physical activity, 23.3% did not consume dairy products daily, 23.9% did not consume enough vegetables, and 32.9% did not regularly control their weight. Additionally, 67.2% reported bending at the waist when lifting objects, and 47.2% did not use a firm appropriate mattress for sleeping. Moreover, 13.9% did not wear proper and standard shoes, and 17% reported that when sitting on a chair, their soles were not flat on the floor. Additionally, 42% did not use standard chairs with backs that were curved to support the waistline, 28.5% of women did not take enough rest during heavy work, and 36% stated that they did not follow preventive principles while standing for long periods. Furthermore, 27.6% did not have a house with proper and safe flooring to prevent them from falling, and 17.1% engaged in pushing heavy objects, which could be potentially harmful.

The results of the present study indicated that among the demographic variables, the severity of joint pain ($P = 0.000$) and economic status ($P < 0.001$) were significantly associated with OA preventive behaviors. Specifically, middle-aged women with less joint pain and those with a better economic status displayed more OA preventive behaviors. Moreover, the relationship between different domains of health literacy and OA preventive behaviors indicated that functional ($P = 0.001$), communicative ($P = 0.000$), and critical health literacy were all significantly related to OA preventive behaviors. This suggests that higher mean scores in each dimension of health literacy were associated with increased OA preventive behaviors among women (Tables 2 and 3).

Predicting Factors for Preventive Behaviors

The results of the multiple regression analysis regarding the predictive dimensions of adopting OA preventive behaviors showed that critical health literacy ($P < 0.001$)

Table 1. Descriptive Statistics of Demographic Variables and Health Literacy Scores of Middle-Aged Women

Variable		Frequency (%)
Marital status	Never married	73 (14.1)
	Married	424 (81.7)
	Divorced	22 (4.2)
Job status	Housewife	366 (70.5)
	Employed	137 (26.4)
	Retired	519 (100)
Education	Primary and guidance school	123 (23.7)
	High school	177 (34.1)
	College	219 (42.2)
Economic situation	Weak	164 (31.6)
	Medium	267 (51.4)
	Good	88 (17)
Family history of arthritis	Yes	170 (32.8)
	No	349 (67.2)
Variable		**Mean ± SD**
Functional HL		3.128 ± 0.74
Communicative HL		2.60 ± 0.57
Critical HL		3.31 ± 0.67
HL(Total)		3.23 ± 0.50
Age		41.85 ± 8.01
Joint Pain		27.35 ± 4.29
BMI		3.83 ± 3.27

Note. SD: Standard deviation; HL: Health literacy; BMI: Body mass index.

Table 2. The Mean Score of Preventive Behaviors Based on Qualitative Demographic Variables

Variable		Preventive Behaviors (Mean ± SD)	*P* Value
Marital status	Never married	8.80 ± 2.36	0.465
	Married	8.78 ± 2.41	
	Divorced	8.13 ± 2.47	
Job status	Housewife	8.67 ± 2.44	0.073
	Employed	8.82 ± 2.36	
	Retired	10.06 ± 1.69	
Education	Primary and guidance school	8.74 ± 2.47	0.417
	High School	8.58 ± 2.48	
	College	8.90 ± 2.30	
economic situation	Weak	9.21 ± 2.29	0 < 001
	Medium	8.74 ± 2.36	
	Good	7.94 ± 2.53	
Family history of arthritis	Yes	8.86 ± 2.41	0.479
	No	8.70 ± 2.40	

Note. SD: Standard deviation.

and the severity of joint pain ($P = 0.001$) were significant predictors of the adoption of OA preventive behaviors. Specifically, controlling for other variables, a one-unit increase in the severity of joint pain is associated with a decrease in the average score of OA preventive behaviors by $\beta = 0.106$, while a one-unit increase in the critical health literacy score was associated with an increase in the average score of OA preventive behaviors by $\beta = 0.258$ (Table 4).

Discussion

The findings of our study indicate that health literacy among middle-aged women is generally acceptable. Among the three domains of health literacy assessed, critical health literacy scored higher and had a better status compared to the functional and communicative domains. This result is consistent with the findings of Farghadani et al who reported the highest health literacy levels in the critical domain (25). However, Mohamadi et al found the highest literacy levels in the functional domain (26). Similarly, studies by Reisi et al (27) and Froze et al (28) reported that participants scored higher in communicative health literacy. These variations suggest that assessing health literacy levels before delivering services within the healthcare system may be beneficial.

Since critical health literacy represents the highest level of health literacy (29), the findings of our study indicate that among the various health literacy domains, critical health literacy stands out as the most significant predictor of OA preventive behaviors in middle-aged women. Critical health literacy involves not only comprehending health information but also the ability to analyze, evaluate, and apply this information effectively to make informed health decisions (30). This capability is particularly vital in managing chronic conditions such as OA, where the implementation of preventive behaviors can significantly influence long-term health outcomes.

In this study, functional and communicative health literacy were not predictors of adherence to arthritis prevention behaviors among women, while critical health literacy emerged as the most influential factor. This finding is reasonable given that most participants demonstrated an acceptable level of functional health literacy, which assesses the ability to read and understand health-related information. Additionally, the widespread availability of health information, including virtual resources, meant that most women encountered few barriers in obtaining arthritis-related information, which reduced the role of communicative health literacy. Nonetheless, communicative health literacy may still be influenced by cultural factors that influence interpersonal interactions (31). Ultimately, our findings suggest that the most influential dimension of health literacy regarding adherence to arthritis prevention behaviors was critical health literacy. Women with higher critical health literacy demonstrated a stronger capacity to interpret and critically evaluate health information, facilitating more effective engagement in OA preventive behaviors. This aligns with existing research that highlights the transformative impact of critical health literacy on health-related behaviors. For instance, Froze et al in a study in Malaysia found that critical health literacy was the strongest predictor of

Table 3. Matrix of Correlation Between Health Literacy and Quantitative Demographic Variables With Preventive Behaviors

Variable	HL (Total)	Functional HL	Communicative HL	Critical Hl	Age	Joint Pain	BMI	Preventive Behaviors
HL (Total)	1	0.589*	0.754*	0.818*	-0.083	-0.075	-0.062	0.319*
Functional HL	0.589*	1	0.032	0.117*	-0.215*	-0.190*	-0.012	0.147*
Communicative HL	0.754*	0.032	1	0.699*	0.006	0.046	-0.043	0.203*
Critical Hl	0.818*	0.117*	0.699*	1	0.057	0.011	-0.080	0.339*
Age	-0.083	-0.215*	0.006	0.057	1	0.319*	0.095*	0.073
Joint pain	-0.075	-0.190*	0.046	0.011	0.319*	1	0.105*	-0.173*
BMI	-0.062	-0.012	-0.043	-0.080	0.095*	0.105*	1	-0.056
Preventive behaviors	0.319*	0.147*	0.203*	0.339*	0.073	-0.173*	-0.056	1

Note. HL: Health literacy; BMI: Body mass index. * Correlation is significant at the 0.05 level.

Table 4. Predictors of Arthritis Prevention Behaviors Based on Variables of Social Cognitive Theory Through the Regression Model

Variables	Coefficient β	Standard Error	t	95% Confidence Interval		*P* Value
				Lower Limit	Upper Limit	
Economic situation						
Weak	Referent					
Medium	0.039	0.286	0.137	-0.523	0.601	0.891
Good	0.469	0.308	1.523	-0.136	1.073	0.128
Joint pain	-0.106	0.031	-3.417	-0.166	-0.045	0.001*
Functional HL	0.049	0.028	1.775	-0.005	0.103	0.076
Communicative HL	-0.032	0.048	-0.668	-0.127	0.062	0.504
Critical HL	0.258	0.042	6.145	0.175	0.340	<0.001*

Note. HL: Health literacy; *Predictor is significant at the 0.05 level.

preventive behaviors against metabolic syndrome among adults (28), underscoring its broad applicability across various health contexts.

Moreover, research by Lai et al highlighted the relationship between critical health literacy and adherence to self-care behaviors among diabetic patients with kidney disease (32). This indicates that critical health literacy not only aids in understanding medical advice but also in the practical application of such advice in daily life. Similarly, Heijmans et al found that critical health literacy was a crucial factor for self-management in patients with chronic diseases in the Netherlands (33). These studies collectively suggest that critical health literacy empowers individuals to manage their health proactively and adhere to recommended health practices.

In light of these findings, it is evident that critical health literacy plays a pivotal role in influencing health behaviors among middle-aged women. Enhancing critical health literacy can improve engagement in OA preventive behaviors, thereby potentially reducing the incidence and severity of OA in this demographic. Therefore, healthcare systems must prioritize the evaluation of health literacy levels among women, with a particular focus on critical health literacy.

Identifying individuals with limited critical health literacy is essential for tailoring interventions that address their specific needs. By implementing targeted educational programs that enhance critical thinking and analytical skills related to health information, we can create a more health-literate population capable of making informed decisions about their health. This approach not only benefits individual health outcomes but also contributes to public health by promoting healthier behaviors and reducing the burden of chronic diseases.

Other findings revealed that more than half of the participants engaged in proper physical activity such as performing daily effective strength and flexibility exercises, followed a relatively healthy diet, wore proper shoes, and controlled their weight. However, they did not practice some behaviors such as using a suitable bed for sleeping, following the standards required for standing for long periods and lifting heavy objects from the ground properly. In contrast to the results of our study, Norozi et al (7) reported that while some preventive behaviors were appropriately performed, others were not properly performed. They also found that about half of the middle-aged women exhibited proper nutritional behavior, but 40% did not regularly control their weight. Regarding joint activity, about half of the participants did not use their joints correctly during daily activities. In general, considering the results of the present study and Norozi and colleagues' study, it can be concluded that the implementation of some OA preventive behaviors among middle-aged women is not appropriate; therefore, it is necessary to provide effective disease prevention training for this population.

Regarding the demographic variables, the severity of joint pain was the most important predictor of OA

preventive behaviors in women. Specifically, women with less joint pain performed OA preventive behaviors more efficiently, indicating that women with joint pain are more likely to avoid preventive behaviors such as physical activity and mobility, which is extremely common among OA patients. Based on the available evidence, over 60% of OA sufferers choose a sedentary lifestyle instead of engaging in proper physical activity, which impedes the adoption of proper physical activity (34). Therefore, it is crucial to raise awareness among middle-aged women about the importance of preventive behaviors to help prevent symptom progression and OA development.

To the best of our knowledge, this is the first study to evaluate the relationship between various dimensions of health literacy and arthritis preventive behaviors in middle-aged women. Nonetheless, this study has certain limitations, which will be addressed. Since arthritis prevention behaviors were assessed via self-report, the reliability of these reports may be affected by recall bias or memory lapses. Additionally, the findings of this study were derived from a cross-sectional survey, which does not establish a causal relationship between FCCHL and arthritis prevention behaviors. A longitudinal study that tracks participants over time and re-evaluates their health outcomes would be beneficial in identifying the causal effects of FCCHL.

Conclusion

Overall, the results of this study indicate that middle-aged women demonstrated an acceptable level of compliance with certain preventive behaviors. However, there were notable deficiencies in others such as maintaining correct posture while sitting or lifting heavy objects. Among the demographic variables, joint pain emerged as the most common predictor of preventive behaviors, with women experiencing more joint pain showing a lower adherence to OA preventive practices. Additionally, critical health literacy was found to be a significant predictor of arthritis preventive behaviors in this population. These findings underscore the importance of the ability to critically analyze and evaluate health information in influencing women's compliance with preventive health behaviors. Given the significant impact of critical health literacy on health outcomes, healthcare systems must assess and enhance the levels of critical health literacy among middle-aged women. Identifying high-risk individuals and providing them with effective prevention training tailored to their health literacy levels can significantly improve their engagement in preventive behaviors, leading to better health outcomes.

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Authors' Contribution

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Competing Interests

The authors declare no potential conflict of interests regarding the research, authorship, or publication of this article.

Ethical Approval

This study was approved by the Bushehr University of Medical Sciences (Ethics Code: IR.BPUMS.REC.1402006).

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