

Effect of Illness Perception and Medication Adherence on Self-Care Ability of Elderly Patients with Hypothyroidism

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Abstract

Background: Hypothyroidism is a prevalent endocrine disorder among elderly individuals. Attaining an optimal level of self-care ability is a vital component of integral nursing management. **Aim:** Determine the effect of illness perception and medication adherence on self-care ability of elderly patients with hypothyroidism. **Method:** A descriptive correlational research design was used. This study was carried out in geriatric and endocrinology outpatient clinics at Specialized Medical Hospital, Mansoura University. A purposive sample of 239 elderly patients with hypothyroidism were enrolled in the study. Data was collected using; the mini-mental state examination scale, demographic and health-related data structured interview sheet, the brief illness perception questionnaire, the 8-item Morisky medication adherence scale, and the self-care ability scale for the elderly. **Results:** 88.3% of the studied elderly with hypothyroidism had low self-care ability (53.67 ± 6.57) while 53.6% had moderate illness perception (42.77 ± 4.05), and 65.20% had low medication adherence level. **Conclusion:** Illness perception and medication adherence were significant predictors for self-care ability in elderly patients with hypothyroidism. **Recommendation:** Develop self-care programs aimed at improving the self-care practice of elderly patients with hypothyroidism taking into consideration the study associated factors.

Keywords: Illness perception, medication adherence, self-care ability, elderly patients, hypothyroidism

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Introduction

Hypothyroidism is the most prevalent thyroid disorder in elderly people ⁽¹⁾. Hypothyroidism is caused by an inactive thyroid gland that secretes more thyroid-stimulating hormone (TSH) and less free triiodothyronine (FT3) and free thyroxine (FT4) into the bloodstream ⁽²⁾. As people get older, the prevalence of hypothyroidism continuously rises. The global prevalence of hypothyroidism is 4.6%, causing hypothyroidism to be the most common endocrine disorder in

the elderly, with a higher prevalence in females ^(3,4). In Egypt, the prevalence of thyroid dysfunction was 29.3% whereas the prevalence of subclinical hypothyroidism was 44.4% and hypothyroidism was 20.6% ⁽⁵⁾. A recent study on the elderly showed that the prevalence of thyroid dysfunction in older adults was 15.9%, with hypothyroidism being the most prevalent thyroid dysfunction with prevalence rates of 9.4% in older female and 7.3% in older male ⁽⁶⁾.

Symptoms of hypothyroidism can vary but commonly include fatigue, weight gain, dry skin, constipation, feeling cold, muscle weakness, depression, and memory problems ⁽⁷⁾. In the older population, common hypothyroidism symptoms are less likely to be noticeable, and if they are, they are more likely to be mistaken for either co-morbid diseases or signs of aging. Elderly patients with hypothyroidism may present with atypical symptoms such as cognitive impairment, depression, and cardiovascular problems. These symptoms can significantly impact the quality of life and functional ability of elderly individuals resulting in lower self-care abilities ⁽⁸⁾.

Self-care ability is the individual's capability to participate in activities that promote their health, prevent diseases, and deal with disease either with or without the support of a healthcare provider. In the context of elderly patients with hypothyroidism, self-care ability plays a vital role in managing their condition and maintaining optimal health ⁽⁹⁾. Therefore, patients with hypothyroidism require motivation, knowledge, and expertise to carry out the behaviors needed to preserve and enhance their health ⁽¹⁰⁾. The growing older population around the world makes self-care assessment increasingly crucial. An older adult's ability for self-management can be influenced by many factors. To help older persons self-manage their condition, nurses are in a crucial position across the continuum of care using person-centered care, which takes into account their abilities, preferences, and support networks to explore factors affecting self-care ^(11,12).

Hypothyroidism has a significant effect on the physical, psychological, and social function which negatively impacts health-related quality of life a condition which may be influenced by illness perception. Illness perception refers to an individual's beliefs, understanding, and emotional response to their illness. It encompasses various dimensions such as the perceived cause of the illness, symptoms experienced, consequences, timeline, personal control, and treatment effectiveness. Understanding the illness perception of elderly patients with hypothyroidism is crucial as it can influence their attitudes, behaviors, and engagement in self-care practices ⁽¹³⁾. Illness perception has a predictive value in using the health behaviors of patients with chronic diseases. Illness perception and positive beliefs about treatment correlate with medication adherence which then influence clinical outcomes ⁽¹⁴⁾.

Medication adherence, or the degree to which elderly patients with hypothyroidism comply with their prescribed medication regimen, is a crucial factor in managing the condition effectively, reducing complications, and improving functional abilities which directly affects overall health. A potential cause of inadequate hypothyroidism management in the elderly is medication non-adherence ⁽¹⁵⁾. Elderly medication non-adherence is a critical public health issue that affects up to 50% of seniors and dramatically raises the morbidity, financial load on the healthcare system, and

healthcare expenses ⁽¹⁶⁾.

Conclusively, hypothyroidism has been recognized to cause significant consequences in persons' physical as well as mental well-being. The coexistence of hypothyroidism results in poor self-care management and the overall quality of life. So, early screening for factors affecting self-care is essential in promoting self-care behavior and maintaining optimal goals in hypothyroidism management ⁽¹²⁾. Illness perception influences self-efficacy-related activities and behaviors and indirectly affects medication use in which people who regard their illness as a serious and life-threatening condition exhibit greater medication adherence ⁽¹⁷⁾. Therefore, healthcare providers, specifically nurses, can play a significant role in this situation by assessing illness perception and medication adherence, which can help patients enhancing their self-care abilities ⁽¹⁸⁾. This study, therefore, sought to explore the effect of illness perception and medication adherence on self-care ability of elderly patients with hypothyroidism

Significance of the study

Hypothyroidism is a common but often unrecognized condition associated with significant morbidity in the older adult population. Managing hypothyroidism in the elderly requires special considerations due to the complexities associated with aging, comorbidities, and multiple medications ⁽¹⁹⁾. Several factors can impact the self-care ability of elderly patients including cognitive impairments, lack of social support, limited access to healthcare resources, poor medication adherence, and negative illness perceptions ⁽²⁰⁾. By recognizing the specific challenges faced the elderly patients and addressing factors such as illness perceptions and medication adherence, nurses and healthcare professionals can support and empower these individuals in effectively managing their hypothyroidism and maintaining their overall health and well-being.

Aim of the study:

Determine the effect of illness perception and medication adherence on self-care ability of elderly patients with hypothyroidism. This was achieved through:

1. Assess the level of illness perception of elderly patients with hypothyroidism.
2. Assess the level of medication adherence among elderly patients with hypothyroidism.
3. Assess the level of self-care ability of elderly patients with hypothyroidism.

Research question

What is the effect of illness perception and medication adherence on self-care ability of elderly patients with hypothyroidism?

Subjects and Method

I- Research Design: A descriptive correlational research design.

II- Setting:

The study was done in the geriatric outpatient clinic and endocrinology outpatient clinic at Specialized Medical Hospital, Mansoura University. The geriatric outpatient clinic worked every Saturday and Wednesday while the endocrinology outpatient clinic worked every Sunday, Monday, and Tuesday. The clinics receive every day around 8 elderly with hypothyroidism.

III- Subjects:

A purposive sample of 239 eligible patients with hypothyroidism of both sexes was selected from the previously stated setting based on the following inclusion criteria:

- Primary hypothyroidism patients aged 60 years and more, who were on treatment for at least 3 months.
- Free from dementia or other mental disease (Score of MMSE scale is ≥ 24).
- Capable to communicate and willing to engage in the study.
- Accessible at data collection time.

Patients with thyroid cancer, central or transient hypothyroidism, neck irradiation, and radioiodine ablation were excluded from the study.

Sample size calculation:

The sample size was estimated based on data from the literature ⁽²¹⁾, level of significance of 5%, and power of study of 80%, using the formula shown; Sample size = $[(Z_{1-\alpha/2})^2 \cdot SD^2] / d^2$, where, $Z_{1-\alpha/2}$ = the standard normal variate at 5% type 1 error ($p < 0.05$) it is 1.96; SD = standard deviation of variable; d = absolute error or precision.

According to the aforementioned method, the sample size = $[(1.96)^2 \cdot (13.41)^2] / (1.7)^2 = 239$ hypothyroid elderly patients.

IV- Tools:

Five tools were used to collect the necessary data:

Tool I: Mini Mental State Examination Scale (MMSE)

The MMSE was created by Folstien et al., ⁽²²⁾, translated into Arabic by Abd El-Moniem ⁽²³⁾, and reliability tested ($r = 0.93$). It was employed to evaluate the elderly' cognitive abilities. There are 11 questions to test memory, sense of place and time, attention, calculation, naming, repetition, registration, language, practical skills, and the ability to duplicate a design. Elders with moderate and severe grades of cognitive impairment were excluded using the MMSE. The total score is 30 points; a score of 24 to 30 indicates normal cognitive function, a score of 18 to 23 shows mild

cognitive impairment, and a score of 0 to 17 indicates severe cognitive impairment on the MMSE scale.

Tool II: Demographic and Health-Related Data Structured Interview Sheet

After reviewing relevant and related literature, it had been prepared by the researchers and involves two parts:

Part 1: Demographic characteristics of the elderly such as age, gender, social status, level of education, occupation before retirement, income, and living condition.

Part 2: Health-related data such as the medical history of chronic diseases, disease duration, periodic check-ups, education about hypothyroidism, satisfaction from time spent with the physician, and following the physician's instructions.

Tool III: The Brief Illness Perception Questionnaire (BIPQ)

It was developed by Broadbent et al.,⁽²⁴⁾. BIPQ is a self-report instrument designed to assess individuals' subjective perceptions and beliefs about their illness. The BIPQ consists of nine items that cover different aspects of illness perception. These items aim to capture how individuals make sense of their illness and how it affects their lives. Cognitive perception was assessed through; item 1 (consequences); item 2 (timeline); item 3 (personal control); item 4 (treatment control); and item 5 (identity). Emotional perception was assessed by items 6 (concern) and 8 (emotional response). The degree of illness understanding was assessed by item 7 (understanding). Respondents are asked to rank the three main causes of their illness in the final, open-ended question (item 9). We added two introductory statements to the questionnaire to set the context of the questions: 'People can have different ideas about hypothyroidism. Please, for each of the following questions, circle the number that best reflects your opinion. Additionally, in each question, the word 'illness' was replaced by 'hypothyroidism'. All questions were answered on a 0 to 10 numerical rating scale. The scores of questions 3, 4, and 7 were reversed. Higher scores mean that participants have considered their disease as a serious and threatening disease, and lower scores indicate a more optimistic view of the disease. The overall BIPQ score was calculated after summing the score for each item where a score <42 was 'low' level of experienced threat, score between 42 and 49 was 'moderate' and 'high' for score ≥ 50 .

Tool IV: The 8-item Morisky Medication Adherence Scale (MMAS-8)

This tool was created by Morisky et al.,⁽²⁵⁾ that includes 7 yes or no items and 1 with a 5-point Likert scale item. Response choices are "yes" or "no" for items 1 through 7 and item 8 has a five-point Likert response scale. Except for item 5, where each "yes" response is rated as 1 and each "no" response is rated as 0, each "no" response is rated as 1 and each "yes" response is rated as 0. To determine the summated score for item 8, the code (0-4) must be standardized by dividing the result by 4. The total score ranged from 0 to 8, where a score of 8 indicates high adherence, 6-7 indicates medium adherence, and less than 6 indicates low adherence.

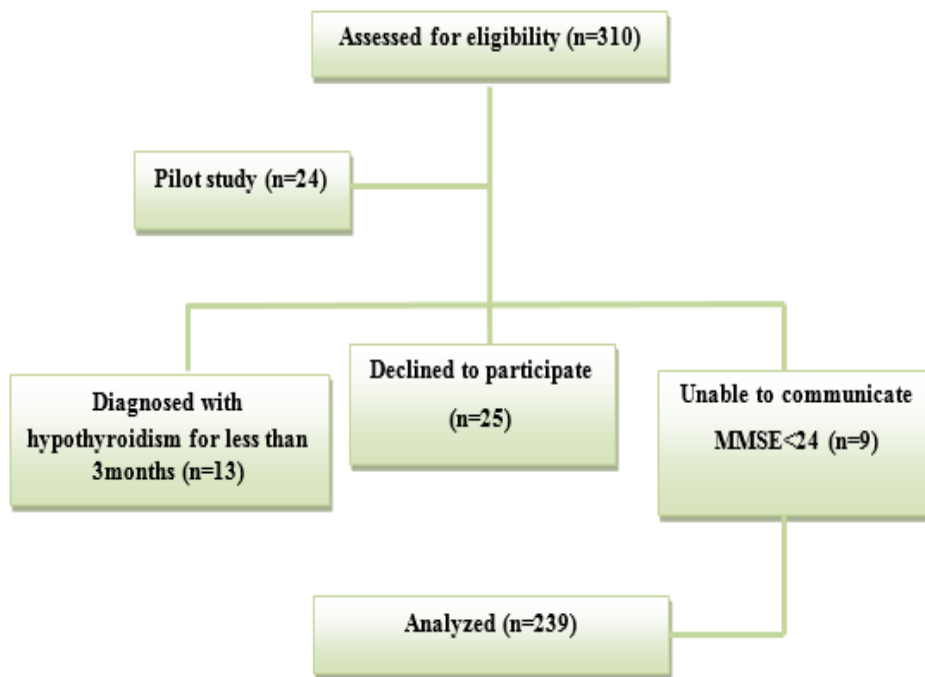
Tool V: Self-Care Ability Scale for the Elderly (SASE)

This was generated by Süderhamn et al.,⁽²⁶⁾ to assess the self-care ability of the elderly with a five-point Likert scale that consists of 17 items distributed on three factors; the repertoire (conducting ADL, IADL involving 8 items; 1, 2, 3, 4, 5, 13, 14, and 17), the wellbeing (physical, psychological and cultural context which affect self-care involving 2 items; 10 and 15), and the goals (individual's intentions to carry out certain actions involving 7 items; 6, 7, 8, 9, 11, 12, and 16). Negatively expressed items 6, 14, 16, and 17 were scored in the reverse order. Every item ranges from 1 to 5 (1 = strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree, and 5 = strongly agree). A cut point was set to < 69 and the total score was 17 – 85 with a higher total score indicating higher self-care ability.

V- Data collection process:

Phase I: Preparatory phase

- Official permission was issued from the responsible authorities of the Faculty of Nursing, Mansoura University. Administrative permissions were granted by the manager of the Mansoura University Hospital after clarifying the study's purpose and the data collection time.
- The researchers created the study tool II (demographic and health-related data structured interview schedule) after the relevant literature was reviewed.
- The researchers translated tool III (The Brief Illness Perception Questionnaire), tool IV (The 8-item Morisky Medication Adherence Scale), and tool V (Self-Care Ability Scale for the Elderly) into Arabic. An expert in the English language from the English Department, Faculty of Education, and Mansoura University employed back translation to confirm the accuracy of the tool translation.
- Five experts in the study's field (3 in Gerontological nursing and 2 in Geriatric medicine) evaluated the study tools for content validity and made the necessary revisions (any modifications required were made accordingly).
- The reliability of the study tools (BIPQ, MMAS-8, and SASE) was assured by the degree to which the scores remained constant after numerous administrations for each tool. The r coefficient of 0.87, 0.81, and 0.83 respectively assured the reliability.
- The Arabic version of the study tool I (Mini-Mental State Examination (MMSE)) was utilized.
- A pilot study was carried out on 10% (24) of elderly patients at the geriatric outpatient clinic at Specialized Medical Hospital, Mansoura University prior to the start of data collection to evaluate the clarity, applicability, and the required time to fill in the study tools. These patients were not a part of the study sample and no modifications were made.



Flow diagram for the study participant

Phase II: Operational phase

- The researchers visited the specialized medical facility five days a week from 9:00 am to 1:00 pm and were able to interview 6 to 7 elderly patients each day based on the schedules of the geriatric (on Saturday and Wednesday) and endocrinology (on Sunday, Monday, and Tuesday) outpatient clinics.
- The researchers introduced themselves to the elderly patient before the interview began. In order to gather the necessary data, the researcher conducted one-to-one interviews with each study participant in the waiting space of the outpatient clinics.
- The purpose of the study was explained to the participants and the researcher provided them with the necessary explanations and assured them about the confidentiality of the information received and if the elderly accepted to participate in the study then informed consent was obtained.
- In order to minimize bias in the study, a face-to-face interview was done with each elderly patient who met the criteria of the study, and the information was gathered from the patients themselves.
- The researchers used to read the question items word by word exactly as it was on the questionnaires to the elderly then the responses were recorded.

- Assessment of each elderly patient was done using all the study tools.
- The study tools needed time taken from 30 -40 minutes to be filled.
- Data collection included five months from the middle of January 2023 till the middle of May 2023.

Ethical Considerations:

The Research Ethics Committee of the Faculty of Nursing, Mansoura University approved the study with reference number (0379). Following an explanation of the study's objectives, the researchers started asking older participants for signed informed consent. The right to remain anonymous and withdraw at any moment as well as confidentiality and privacy were all assured.

Statistical analysis:

Statistical Package for Social Sciences (SPSS) Version 21 was used to analyze the data. Numbers and percentages were used to represent the qualitative variables. In the form of frequencies, mean, standard deviation, minimum, and maximum; the descriptive statistics were derived. The correlation between the various study variables was assessed using Pearson's correlation coefficient (r). To identify the variables influencing elderly people with hypothyroidism's ability for self-care, a multivariate regression analysis was utilized. The significance level was established at $p \leq 0.05$. In order to visualize the data, the graph was created in Microsoft Excel.

Results

Table 1 shows that the mean age of the studied elderly patients was 71.56 ± 8.75 years of which 53.6% were females and 46.4% were married. Illiteracy prevailed among 34.3%, while, 53.6% were residing in rural areas, 67.8% did not work now, 63.2% their income was not enough, and 66.9% were living with their family.

Table 2 demonstrates that 77% of the studied elderly suffered from hypothyroidism for $1 > 3$ years. Fatigue was the most common hypothyroidism-related symptom reported by 66.1%, while, dry skin was the least one reported by 13.8%. Moreover, 72.4% suffered from side effects from Levothyroxine, 87% of them did not follow TSH level, 22.2% suffered from three or more diseases, 62.8% took 5 medications or more, 59.6% of them were not satisfied with the time spent with the physician and 67.4% did not follow the physician's instructions.

Table 3 the total mean score of the illness perception (BIPQ items) was (42.77 ± 4.05) . Out of the eight items of BIPQ, treatment control and consequences had the highest and lowest scores, respectively $(6.07 \pm 1.90$ vs $4.49 \pm 1.42)$. Moreover, 42.7% relate hypothyroidism to hereditary causes.

Table (1): Distribution of the studied participants according to their demographic characteristics

Demographic Characteristics	N= 239	100%
Age (years)		
60 - 74	128	53.6
75 – 84	83	34.7
≥ 85	28	11.7
Mean ± SD (Min – Max)	71.56±8.75 (60-88)	
Sex		
Female	128	53.6
Male	111	46.4
Marital status		
Married	111	46.4
Widow	74	31.0
Single	28	11.7
Divorced	26	10.9
Educational level		
Illiterate	82	34.3
Read and write	48	20.1
Secondary education	69	28.9
Higher education	40	16.7
Place of residence		
Rural	128	53.6
Urban	111	46.4
Work before retirement		
Not work	146	60.1
Work	93	38.9
Current work		
No	162	67.8
Yes	77	32.2
Monthly family income		
Not enough	151	63.2
Enough	88	36.8
Living arrangements		
With family	160	66.9
Alone	79	33.1

Table (2): Distribution of the studied participants according to their medical history

Medical history	N (239)	100%
Duration of disease		
1>3 years	184	77.0
3 years and more	55	23.0
Mean \pm SD(Min-Max)	2.32 \pm 1.37 (1-5)	
Symptoms of hypothyroidism[#]		
Fatigue	158	66.1
Lack of concentration	144	60.3
Myalgia	137	57.3
Bradycardia	119	49.8
Depression	99	41.4
Constipation	92	38.5
Hair loss	76	31.8
Increased weight	67	28.0
Dry skin	33	13.8
Side effects of Levothyroxine		
Yes	173	72.4
No	66	27.6
Follow TSH level		
No	208	87.0
Yes	31	13.0
Presence of other disease		
No	68	28.5
One disease	51	21.3
Two disease	67	28.0
Three or more diseases	53	22.2
Number of medications		
5 medications or more	150	62.8
Less than 5 medications	89	37.2
Periodic medical checkup		
No	134	56.1
Yes	105	43.9
Receiving health education about hypothyroidism		
Yes	92	38.5
No	147	61.5
Time spent with the physician		
Satisfied	97	40.6
Not satisfied	142	59.4
Follow the physician's instructions		
Yes	161	67.4
No	78	32.6

[#] More than one answer was given

Table (3): Mean score of illness perception among the studied participants

Items	BIPQ	Mean ± SD	Min - Max
Consequences	Impact of hypothyroidism on the patient's life	4.49±1.42	2.00-6.00
Timeline	Chronicity of own hypothyroidism	4.72±1.63	2.00-7.00
Personal control	Controlling own hypothyroidism	5.95±2.05	3.00-9.00
Treatment control	Confidence in the treatment of own hypothyroidism	6.07±1.90	3.00-9.00
Identity	Perception of hypothyroidism symptoms	5.00±1.90	2.00-8.00
Concern	Worrying about own hypothyroidism	5.20±1.99	2.00-8.00
Understanding	Understanding own hypothyroidism	5.76±2.18	3.00-9.00
Emotional response	Negative effect of hypothyroidism on emotional state	5.53±2.26	2.00-9.00
Total score for illness perception		42.77±4.05	37.00-51.00
Perceived causes of hypothyroidism		N (239)	%
	Hereditary	102	42.7
	Psychological stress	94	39.3
	Life style	43	18

Figure 1 displays that 53.6% of the studied elderly with hypothyroidism had a moderate level of illness perception while only 11.7% of them experienced a high level of illness perception.

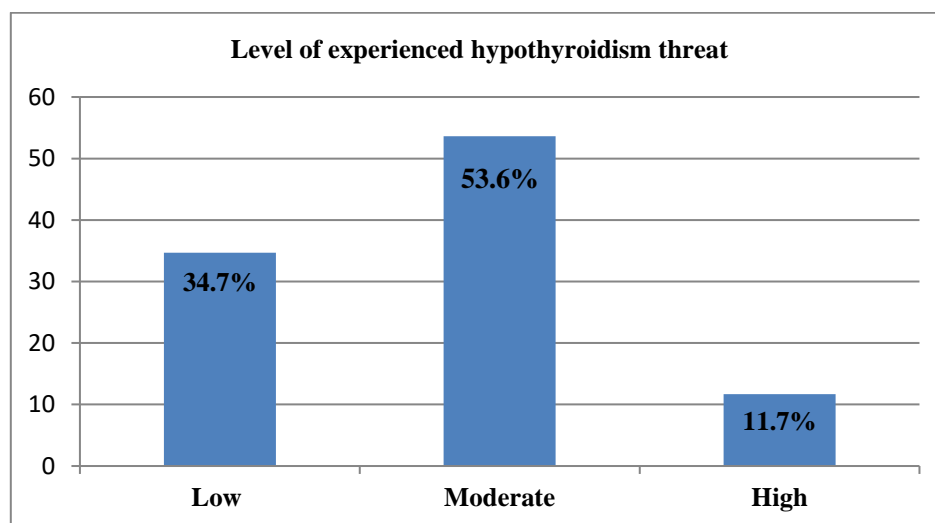


Figure (1): Distribution of the studied participants according to their level of illness perception

Figure 2 shows the percentage of medication adherence levels of the studied elderly with hypothyroidism. It displays that 65.20% of the studied elderly patients had a low level of medication adherence while only 13% of them had a high adherence level with mean \pm SD 4.82 ± 1.90 .

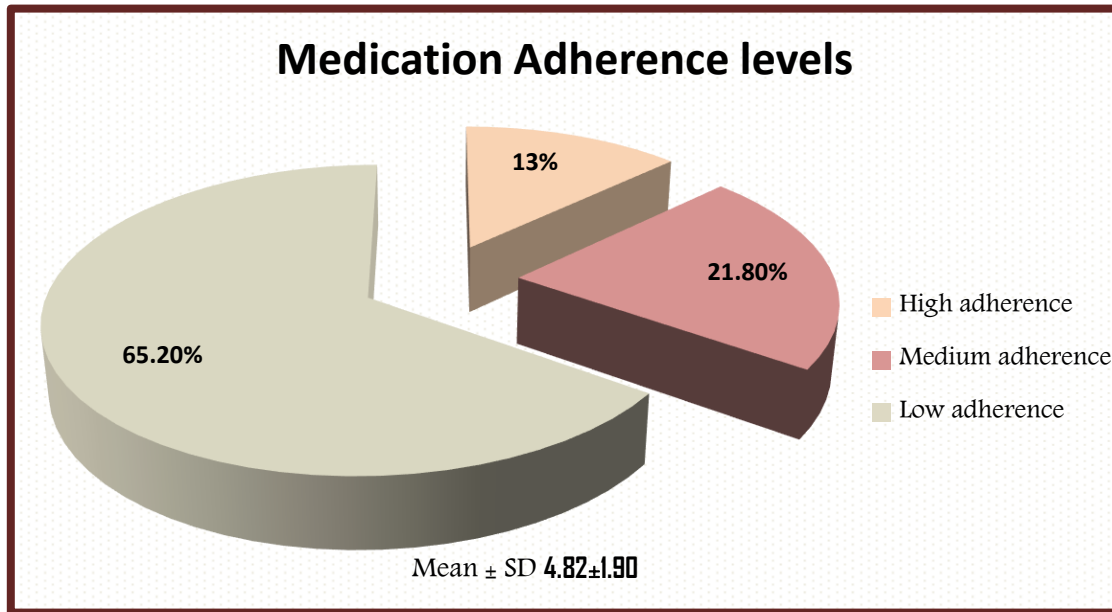


Figure (2): Distribution of the studied participants according to their levels of medication adherence

Table 4 illustrates that the overall total self-care ability score was low reported by 88.3% of the studied elderly patients with hypothyroidism with a mean of 53.67 ± 6.57 ; below the established cut-off (< 69). Similarly, self-care ability dimensions were estimated at low levels with mean of 59.43 ± 9.85 , 52.94 ± 6.40 , & 54.30 ± 5.57 for the ability to care for repertoire, well-being, and goal respectively.

Table (4): Mean score of self-care ability among the studied elderly with hypothyroidism

SASE Dimension	Mean \pm SD
Ability to care for repertoire (ADL)	59.43 ± 9.85
Ability to care of well-being	52.94 ± 6.40
Ability to care of goal	54.30 ± 5.57
Total score for self-care ability	53.67 ± 6.57
Frequency of low self-care ability (%) (Scores < 69)	211 (88.3%)

ADL: Activities of Daily Living

Table 5 displays a highly statistically positive correlation between the dimensions of illness perception and the total mean score of self-care ability ($p=0.000$), in which viewing hypothyroidism as a serious and threatening disease was significantly associated with higher elderly self-care ability. On the other hand, medication adherence was positively associated with self-care ability ($r=0.432$) in which the higher medication adherence, the higher self-care ability for elderly with hypothyroidism.

Table (5): Bivariate correlation between self-care ability, illness perception, and medication adherence of the studied participants

	Total score for self-care ability	
	r	P
Dimension Illness Perception		
Consequences	0.513	0.000**
Timeline	0.602	0.000**
Personal control	0.775	0.000**
Treatment control	0.736	0.000**
Identity	0.645	0.000**
Concern	0.764	0.000**
Understanding	0.461	0.000**
Emotional response	0.786	0.000**
<i>Total Score of BIPQ</i>	0.556	0.000**
Medication adherence		
<i>Total score of MMAS</i>	0.432	0.000**

Table 6 revealed that an elderly patient who was young age, female, living with family, had a short duration of hypothyroidism, had no other disease, consumed less than 5 medications, satisfied with physician visits, held high illness perception and medication adherence had a high level of self-care ability ($\beta=-0.897, -0.578, 1.478, 1.904, -0.396, -1.193, 0.451, 0.411$ & 0.628 respectively) in which the all mentioned factors were predictors of self-care ability among the studied participants.

Table (6): Multivariate regression for self-care ability in elderly patients with hypothyroidism

Predictors	Self-care ability			
	Beta	t	P value	B (95%CI)
Age	-0.897	-6.34	0.000	-11.33 (-14.8- 7.8)
Sex	-0.578	-5.24	0.000	-10.12 (-13.9-6.3)
Social status	0.058	0.59	0.551	1.02 (-2.3-4.3)
Education	0.072	1.27	0.203	0.567 (-.31-1.4)
Work now	0.052	0.79	0.428	0.979 (-1.4-3.41)
Income	0.039	0.48	0.632	0.711 (-2.2-3.6)
Living with	1.478	17.08	0.000	27.42 (24.2-30.5)
Hypothyroidism duration	1.904	11.84	0.000	39.48 (32.9- 46.1)
Comorbidities	-0.396	-4.64	0.000	-9.78 (-13.9-5.6)
Number of medication	-1.193	-9.09	0.000	-21.54 (-26.2-16.8)
Time of visit	0.451	5.17	0.000	8.09 (5.1-11.1)
Illness Perception	0.411	6.39	0.000	5.59 (7.3-3.8)
Medication adherence	0.628	6.48	0.000	7.68 (5.3-10.1)

R²=0.875, F=121.651, p< 0.001**

R², coefficient of determination; B, coefficient of regression; CI, confidence interval
Variables entered and excluded: Receiving health education about hypothyroidism

Discussion:

Hypothyroidism is a prevalent endocrine disorder among elderly individuals. Nurses can assist and empower elderly patients to manage their hypothyroidism and preserve their general health and well-being by understanding the unique obstacles they experience and addressing issues including illness perceptions and medication adherence ⁽²⁷⁾. Therefore, the present study aimed to study the effect of illness perception and medication adherence on self-care ability of elderly patients with hypothyroidism.

Hypothyroidism is more frequent in older persons than younger ones, specifically in women, because of the increased prevalence of autoimmune thyroiditis ⁽³⁾. Supporting that, this study included 239 elderly patients with hypothyroidism, their ages ranging from 60-88 years with a mean of 71.56±8.75, and more than half were female. This result was similarly reported by Wildisen, et al., (2021) ⁽²⁸⁾, Stuber, et al., (2020) ⁽²⁹⁾, and Stott, et al., (2017) ⁽³⁰⁾. Regarding the other demographic characteristics, the largest number of the elderly studied were married, illiterate, living in rural, their income was insufficient, and living with family. Studies done in Egypt by Abd Elazeem et al., (2023) ⁽³¹⁾, and Mowafy et al., (2022) ⁽³²⁾ reported similar findings.

Fatigue was the most reported symptom of hypothyroidism by the studied elderly followed by lack of concentration. Similarly, a study conducted in Mexico by Ruíz-Pacheco et al., (2023) ⁽³³⁾, in Canada by Samuels & Bernstein, (2022) ⁽³⁴⁰⁾, and in Egypt by El Najjar et al., (2022) ⁽³⁵⁾ in which fatigue is prominent in patients with hypothyroidism. Moreover, the majority of the studied elderly did not follow TSH levels, didn't receive health education, and were dissatisfied with time spent with the physician. Many factors could contribute to these gaps in the awareness and practices noted amongst hypothyroid elderly patients. The most important factor could be the lack of expertise among the treating physicians about hypothyroidism in the elderly. Another factor that needs to be addressed is inadequate time spent by the doctor on patient education. In congruent with, Goel et al., (2017) ⁽³⁶⁾ in India who reported that patients did not come for regular follow-ups in which thyroid function tests were done only when their doctor had advised in the majority of the patients. Also, the findings of the survey done by Mitchell et al., (2021) ⁽³⁷⁾ in the United Kingdom (UK) where the majority of patients reported high levels of treatment and care dissatisfaction and received no information from general practitioners. On the other hand, Mostafa et al., (2018) ⁽³⁸⁾ compare elderly patient satisfaction with healthcare in Egypt and Saudi Arabia and concluded that many elderly patients are still dissatisfied with the provided medical services.

In general, multimorbidity and polypharmacy are more common in older hypothyroidism persons resulting in increases in the likelihood of drug interactions and/or negative side effects from levothyroxine replacement therapy for hypothyroidism ⁽³⁹⁾. Supporting this, the majority of the studied elderly were suffering from other disease than hypothyroidism, taking more than 5 medications, and suffering from side effects from medication. These results reflect the complexity of managing hypothyroidism in the elderly with polypharmacy and multimorbidity. A similar result was reported by Livecchi, et al., (2022) ⁽⁴⁰⁾ in the USA who found older patients with more comorbidities were more likely to be on medications that interfere with thyroid hormone. Also, Sabud et al., (2022) ⁽⁴¹⁾ in India reported that Thyroxine or levothyroxine had many side effects.

In the present study illness perception was assessed using the Brief Illness Perception Questionnaire in which "treatment control" had the highest mean score while consequences obtained the lowest mean score and the overall illness perception was moderate. The treatment control domain had the highest perception of illness may be related to elderly patients may see effective treatment and management of hypothyroidism as a means to maintain their independence and continue living an active and fulfilling life. The lower score in consequences could indicate a lack of awareness or perceived impact of hypothyroidism on their lives. Elderly patients may not fully recognize or attribute certain consequences or effects of hypothyroidism to their condition as reflected by the study result that a considerable number of the studied elderly were illiterate and did not receive health education.

Interestingly, a study done in India by Arora et al., (2022) ⁽⁴²⁾ in which more than half of the participants were very concerned about hypothyroidism, and the study conducted in the UK by Dew et al., (2017) ⁽⁴³⁾ found patients with hypothyroidism generally had a low understanding of

their condition, this is reflected on their perception of illness by negative impact. According to, Cudris-Torres et al., (2023)⁽⁴⁴⁾ in Colombia, older adults tend to perceive the disease's effects to be a large burden using BIPQ. Moreover, Pawlikowska-Łagód & Suchodolska, (2022)⁽⁴⁵⁾ in Poland illustrated that elderly patients perceived their illness in the context of physical and mental destruction with a negative perception of their illness. This result should be a guideline for health care providers including nurses to communicate with the patient as much as possible, talk about the disease and change their perspective.

Medication adherence is essential for effective hypothyroidism management in elderly patients. However, the impact of hypothyroidism on quality of life, the associated low treatment effect experienced, polypharmacy, and co-morbidities in elderly patients challenge the treatment motivation and thus the adherence⁽¹⁵⁾. Supporting this, current results demonstrate that about two-thirds of the studied elderly patients had low adherence levels to their medication. This outcome may be also related to the complex Levothyroxine therapy regimen, which required varying doses over weekdays to attain optimal titration, taken in the fasting state and polypharmacy makes it more difficult to achieve ideal absorption and increase the possibility of side effects. Managing multiple medications can increase the complexity of the regimen and lead to confusion or forgetfulness. The cost of thyroid hormone replacement medication can be a barrier to adherence, particularly for elderly individuals on fixed incomes or with limited insurance coverage. This is agreed with a study conducted in Turkey by Kilit et al., (2022)⁽⁴⁶⁾, and in Lebanon by El Helou et al., (2019)⁽⁴⁷⁾ which showed the same result that most of the studied hypothyroid patients had low medication adherence levels and in Iraq by Salih & Ismail, (2022)⁽⁴⁸⁾ who found elderly patients had low medications adherence level.

According to study results, the majority of the studied hypothyroid elderly had low self-care ability. This result may be justified by older people with thyroid diseases having limited self-care abilities due to bone fragility, muscle weakness, and gait and balance problems associated with hypothyroidism and comorbidity. The overall self-care ability score is consistent with the existing literature for these elderly populations^(20, 49, & 50). According to Khanal, et al., (2022)⁽¹²⁾ in Nepal, more than half of patients with hypothyroidism had inadequate level of self-care. However, Nila et al., (2018)⁽⁵¹⁾ in India showed that the majority of patients with hypothyroidism had good self-care management. This difference in findings was due to differences in the type of questionnaire used and in addition due to differences in sample characteristics. Overall, this finding indicates that the elderly need education for self-care rehabilitation. According to, Benmaamar et al., (2023)⁽⁵²⁾ in Morocco, Ghamri, et al., (2022)⁽⁵³⁾ in Jeddah, SAU, Al Quran et al., (2020)⁽⁵⁴⁾ in Spain and Recker et al., (2019)⁽⁵⁵⁾ in Germany; patients with hypothyroidism had lower total quality of life scores, especially concerning their physical health component. According to Salehi & Keikavoosi-Arani, (2020)⁽⁵⁶⁾ in Iran, the physical status is an important factor in geriatric self-care, since self-care is a practice by which each individual apply their knowledge, skills, and abilities to “independently” take care of their health.

With increasing age, the level of self-care in the elderly population decreases ⁽⁵⁷⁾. Supporting this, the lowest mean of self-care ability was reported in the age group of ≥ 85 years with a statistically significant difference between different age groups and age was a significant predictor for self-care ability in this study. This result may be in part due to the most of the studied elderly had several chronic diseases at the same time. Older adults with chronic conditions may experience significant limits in their social, physical, and mental abilities, and they may become dependent on others for everyday needs. Similar research findings also show that the older the patient, the lower the level of self-care ⁽⁵⁸⁻⁶¹⁾.

Another finding of this study, sex was a significant predictor for self-care ability in which females reported a significantly higher mean of self-care than males. Explaining this finding, females are less likely to engage in high-risk behaviors as smoking. Females seek information about health care and take health information more seriously more often than males because women are in our culture responsible for family care so they are often expected to have more information in this area to achieve better family health. In addition, males depend on others rather than on themselves and perceive more social support in our culture than females which may impede their self-care ability. This finding was consistent with the results obtained in the study of Avazeh et al. (2019) ⁽⁶²⁾ in Iran, and Eknithiset, (2017) ⁽⁶³⁾ in Thailand. In contrast, SangSefidi et al., (2018) ⁽⁵⁰⁾ in Iran concluded that almost more than three-quarters of women had low self-care. This difference may be attributed to different cultures and study settings.

Social support is an important factor in increasing the self-care ability of elderly people ⁽⁶⁴⁾. According to the result of the present study, living with family was associated with high self-care ability. This could be due to living with family members having many advantages such as the presence of social support, assistance with daily activities, shared responsibility, and improved emotional well-being than those who live alone. All contribute to better self-care management and ultimately better health outcomes. As reported in the study results living alone in elder people emerged as a significant predictor for low self-care ability. This is in line with Ziaeefer, et al., (2021) ⁽⁵⁹⁾, (2020), and Avazeh et al. (2019) ⁽⁶²⁾ in Iran which showed that family support was significantly associated with high self-care ability. Furthermore, Shamlou et al., (2021) ⁽⁶⁵⁾ in Iran and Nieboer et al., (2020) ⁽⁶⁶⁾ in The Netherlands found an inverse relationship between loneliness and self-care ability among older adults.

Duration of hypothyroidism was found to be a predictor for self-care ability among the studied elderly. One explanation for this is that prolonged exposure to hypothyroidism symptoms, such as fatigue, weight gain, and cognitive difficulties, might accumulate and impact the elderly patient's ability to engage in self-care activities. These findings are consistent with the previous studies, where the duration of the disease was a predictor of the level of self-care ⁽⁶⁷⁻⁶⁹⁾. Moreover, an Integrative overview done by Araújo-Soares et al., (2019) ⁽⁷⁰⁾ in the UK revealed that the self-care behaviors of patients with chronic diseases have been shown to change over time.

Previous studies indicated that the presence of comorbidities and polypharmacy in elderly patients can affect their self-care level ^(60,59,69,&71), which corresponds with the results of this study. However, this study differed in terms of the participants, which included the elderly with hypothyroidism. Comorbidities in elderly patients often necessitate multiple medications. Managing multiple drugs can be overwhelming and confusing, leading to difficulties in adhering to the prescribed medication regimen. The more medications an elderly patient needs to take, the higher the chances of potential drug interactions and missed doses, which can compromise self-care. Considering these results, comorbidities should be taken into account when attempting to improve self-care for the elderly with hypothyroidism.

Time spent with the physician during the visit was found to be a predictor for the high self-care ability of the studied elderly with hypothyroidism in multivariate analysis in this study. Consistent with Ladner, et al.,(2021)⁽⁷²⁾ in the United Arab Emirates and the meta-synthesis analysis done by Schulman-Green et al., (2016) ⁽⁷³⁾ in USA revealed that time spent with the physician was one the most predictive factors of a high ability to self-manage chronic diseases. Also, a longitudinal study done by Cramm & Nieboer (2015) ⁽⁷⁴⁾ in The Netherlands showed that productive interactions between physicians and patients strongly predicted patients' self-management abilities.

Conclusively the study revealed that illness perception and medication adherence were significant predictors for the self-care ability of elderly persons with hypothyroidism. Individuals with a better understanding of their illness, perceiving it as serious & controllable, and having a clear understanding of its consequences, are more likely to engage in self-care behaviors. This includes activities like medication adherence, lifestyle modifications, symptom monitoring, and seeking appropriate healthcare. Similarly, the study of Mohamed et al., (2022) ⁽⁷⁵⁾ in Egypt found a significant relationship between self-care maintenance and patient perception of their illness regarding all dimensions of illness perception. Other research by Hu et al., (2022) ⁽⁷⁶⁾ in China found that perceived disease severity was a promoting factor for self-care behaviors. Kim et al., (2019) ⁽⁷⁷⁾ in Korea and Rakhshan et al., (2020) ⁽⁷⁸⁾ in Iran found positive association between illness perception and self-care management. Also, Rivera, et al., (2018) ⁽⁷⁹⁾ in the USA reported that different dimensions of illness perception were associated with self-care-related outcomes in older adults.

Interestingly, regression analysis performed in the study of Meraz et al., (2023) ⁽⁸⁰⁾ in the USA reported that medication adherence was a significant predictor of higher levels of self-care activation. Krzemińska et al., (2021) ⁽⁸¹⁾ in Italy revealed that the higher the level of treatment adherence, the higher self-efficacy in each of the areas of functioning. Hancerlioglu et al., (2019)⁽⁸²⁾ in Turkey also revealed a significant correlation between self-care management and compliance to medication.

Conclusion

From the findings of this study, it can be concluded that more than half of elderly patients had moderate illness perception about hypothyroidism and low medication adherence while the majority of them had low self-care ability. It was evident that illness perception and medication adherence were significant predictors of the self-care ability of elderly patients with hypothyroidism. Furthermore, elderly patients who were young age, female, living with family, had a short duration of hypothyroidism, had no other disease, consumed less than 5 medications, and satisfied with time spent with the physician had a high level of self-care ability.

Recommendations

- Designing self-care programs focused on enhancing the self-care practice of elderly patients with hypothyroidism taking into consideration illness perception, medication adherence, and other associated factors.
- Elderly patients should be provided with an illustrated and simple guide booklet providing them with the necessary data about hypothyroidism and the importance of medication adherence in improving their self-care ability.
- Further research aimed at examining the effect of developed self-care programs for elderly hypothyroid patients.

Strengths and limitations

This study has made a contribution to the limited literature about self-care in elderly with hypothyroidism. To our knowledge, it is one of the first studies to evaluate self-care ability in elderly with hypothyroidism considering the effect of illness perception and medication adherence. However, this study also had limitations including; the data being collected by self-reporting, which may not reflect the actual performance of the participant. In addition, the investigation of the patients in the treatment centers affiliated with one medical university hospital and a relatively small sample. Hence, further studies are recommended to evaluate a larger sample of hypothyroidism patients in several treatment centers affiliated with other universities of medical sciences.

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Declaration of Competing Interest

The researchers affirm that they do not have any competing interests. Upon a reasonable request, the corresponding author will provide all information needed, including statistics.

References:

1. Kocelak, P., Mossakowska, M., Puzianowska-Kuźnicka, M., Sworczak, K., Wyszomirski, A., Handzlik, G., Stefański, A., Zdrojewski, T., & Chudek, J (2022). Prevalence and risk factors of untreated thyroid dysfunctions in the older Caucasian adults: Results of PolSenior 2 survey. *PLOS ONE*, 17(8), e0272045.
2. AlAwaji, M. I., & Alhamwy, R. H. (2023). The Impact of Hypothyroidism on the Quality of Life of Adults in Riyadh, Saudi Arabia. *Cureus*, 15(4).
3. Kim MI. Hypothyroidism in Older Adults (2020). In: Feingold KR, Anawalt B, Boyce A, et al., editors. *Endotext* [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK279005/>. Accessed on 23 June 2023.
4. Calsolaro, V., Niccolai, F., Pasqualetti, G., Calabrese, A. M., Polini, A., Okoye, C., Magno S, Caraccio N, & Monzani, F. (2019). Overt and subclinical hypothyroidism in the elderly: when to treat?. *Frontiers in Endocrinology*, 10, 177.
5. Ibrahim, M. H. E. D., Alsebaie, M. M., Elbendary, H. I., & Yousief, E. M. (2019). Study of the relationship of thyroid status and frailty in older Egyptian men. *The Egyptian Journal of Internal Medicine*, 31(4), 884-895.
6. Deraz, H. A. A., Shawk, N. M., Abednabi, A. S. M., & Ali El-Feitouri, G. O. (2019). Study of Thyroid Profiles in the Elderly. *Zagazig University Medical Journal*, 25(5), 648-656.
7. Alzghoul, B. N., Amer, F. N., Barb, D., Innabi, A., Mardini, M. T., Bai, C., Alzghoul, B., Al-Hakim, T., Singh, N., Buchanan, M., Serchuck, L., Manjarres, D. G., Woodmansee, W. W., Maier, L. A., & Patel, D. C. (2021). Prevalence and characteristics of self-reported hypothyroidism and its association with nonorgan-specific manifestations in US sarcoidosis patients: a nationwide registry study. *ERJ Open Research*, 7(1).
8. Leng, O., & Razvi, S. (2019). Hypothyroidism in the older population. *Thyroid research*, 12(1), 1-10.
9. Amir-Behghadami, M., Tabrizi, J. S., Saadati, M., & Gholizadeh, M. (2020). Psychometric properties of the Iranian version of self-care ability scale for the elderly. *BMC geriatrics*, 20(1), 1-7.
10. Aqeeli, M. J. S. A., & Hassan, H. S. (2022). Effectiveness of an Instructional Program on Hypothyroidism Patients' Knowledge toward Self Care in Baghdad Teaching Hospitals. *Teikyo Medical Journal*, 45 (01), 4947 - 4957.
11. Byrne, G., Keogh, B., & Daly, L. (2022). Self-management support for older adults with chronic illness: implications for nursing practice. *British Journal of Nursing*, 31(2), 86-94.
12. Khanal, D., Chapagain, S., & Thapa, S. (2022). Anxiety, Depression and Self-Care Management among Hypothyroidism Patients Attending Chitwan Medical College Teaching Hospital, Chitwan. *Journal of Diabetes and Endocrinology Association of Nepal*, 6(2), 2-8.
13. Akyildiz, G., Elboğa, G., Elboğa, U., & Şahin, E. (2019). The relationship between illness perception and quality of life in thyroid patients who received radioactive iodine-131 ablation treatment. *Medical Science and Discovery*, 6(3), 54-58.
14. Eshete, A. (2023). Association between Illness Perception and Medication Adherence in Patients with Diabetes mellitus type II in North Shoa, Zone: Cross-Sectional study.

15. Effraimidis, G., Watt, T., &Feldt-Rasmussen, U. (2021). Levothyroxine therapy in elderly patients with hypothyroidism. *Frontiers in Endocrinology*, 12, 641560.
16. Gruszczynska, M., Wyszomirska, J., Daniel-Sielanczyk, A., &Bak-Sosnowska, M. (2021). Selected psychological predictors of medication adherence in the older adults with chronic diseases. *Nursing Open*, 8(1), 317-326.
17. Kim, H., Sereika, S. M., Lingler, J. H., Albert, S. M., & Bender, C. M. (2021). Illness perceptions, self-efficacy, and self-reported medication adherence in persons aged 50 and older with type 2 diabetes. *The Journal of cardiovascular nursing*.36(4), 312–328.
18. Mobini, S., Allahbakhshian, A., Shabanloei, R., &Sarbakhsh, P. (2023). Illness Perception, Self-Efficacy, and Medication Adherence in Patients with Coronary Artery Disease: A Path Analysis of Conceptual Model. *SAGE open nursing*, 9, 1-14.
19. Lage, M. J., Espaillet, R., Vora, J., &Hepp, Z. (2020). Hypothyroidism Treatment among Older Adults: Evidence from a Claims Database. *Advances in therapy*, 37(5), 2275–2287.
20. Noohi, S., Karamitanha, F., &Shoghli, A. (2022). Self-Care Ability of the Elderly and Related Factors. *Preventive Care in Nursing & Midwifery Journal*, 12(4), 19-25.
21. Alluhayyan, O. B., Alsahly, R. J., Aldawsari, A. A., Alghabawy, K. A., Alqaan, R. S., Almutairi, A. F., &Alharbi, S. A. (2020). Illness perception and medication adherence among patients with primary hypothyroidism in al qassim, Saudi Arabia. *Patient preference and adherence*, 14, 1111.
22. Folstien, M. (1999). *Mini-Mental State, a practical method for grading the cognitive state of patients for the clinician in clinical Gerontological Nursing: A Guide to Advanced Practice*. 2nd. London: WBSaunders Company.
23. Abd El Moniem, M. (2012). *Comparative study of the effect of three types of restorative Nursing Interventions on the health-related functional status of geriatric patients with Parkinson's disease*. Doctorate thesis: University of Alexandria, Faculty of Nursing.
24. Broadbent, E., Petrie, K. J., Main, J., &Weinman, J. (2006). The brief illness perception questionnaire. *Journal of psychosomatic research*, 60(6), 631-637.
25. Morisky, D. E., Ang, A., Krousel-Wood, M., & Ward, H. J. (2008). Predictive validity of a medication adherence measure in an outpatient setting. *The journal of clinical hypertension*, 10(5), 348-354.
26. Süderhamn, O., Ek, A. C., &Pörn, I. (1996). The self-care ability scale for the elderly. *Scandinavian Journal of Occupational Therapy*, 3(2), 69-78.
27. Sharma, S. K., Mudgal, S. K., & Mandal, A. (2020). Thyroid disease in older people: Nursing perspectives. *Thyroid Research and Practice*, 17(3), 110-117.
28. Wildisen, L., Feller, M., Del Giovane, C., Moutzouri, E., Du Puy, R. S., Mooijaart, S. P., Tinh-Hai C., Poortvliet, R. K. E., , Kearney,P. Quinn, T.J., Klöppel,S., Bauer,D. C., Peeters, R. P., Westendorp,R., Aujesky, D., Gussekloo, J.,&Rodondi, N. (2021). Effect of levothyroxine therapy on the development of depressive symptoms in older adults with subclinical hypothyroidism: an ancillary study of a randomized clinical trial. *JAMA network Open*, 4(2), e2036645-e2036645.
29. Stuber, M. J., Moutzouri, E., Feller, M., Del Giovane, C., Bauer, D. C., Blum, M. R., Collet, T. H., Gussekloo, J., Mooijaart, S. P., McCarthy, V. J. C., Aujesky, D., Westendorp, R., Stott, D. J., Glynn, N. W., Kearney, P. M., &Rodondi, N. (2020). Effect of Thyroid Hormone Therapy on Fatigability in Older Adults with Subclinical Hypothyroidism: A Nested Study within a Randomized Placebo-Controlled Trial. *The journals of gerontology. Series A, Biological sciences and medical sciences*, 75(9), e89–e94.

30. Stott, D. J., Rodondi, N., Kearney, P. M., Ford, I., Westendorp, R. G., Mooijaart, S. P., ...&Gussekkloo, J. (2017). Thyroid hormone therapy for older adults with subclinical hypothyroidism. *New England Journal of Medicine*, 376(26), 2534-2544.
31. Abd Elazeem, W. A., Ali, H. A., & Mahmoud, D. M. (2023). Effect of An Educational Protocol on Hypothyroidism Patients' Knowledge and Practice. *Journal of Nursing Science Benha University*, 4(1), 1196-1210.
32. Mowafy, M., Rushdy, E. A., Rakha, M., Elshekheiby, E., &Soliman, S. (2022). The Impact of Early Levothyroxine Replacement in Subclinical Hypothyroidism on Glycemic Control Parameters and Quality of Life in Adult Patients. *Open Access Macedonian Journal of Medical Sciences*, 10(B), 2098-2103.
33. Ruíz-Pacheco, M. G., Hernández, I., Hernández-Estrella, G., Basurto, L., Vargas-Ortega, G., González-Virla, B., Molina-Ayala, M., Hernández-Martínez A. F., Luengas-Mondragón, R.,Hernández-Allende, A. A., Mendoza-Zubieta, V.,& Balcázar-Hernández, L. (2023). Severity of Fatigue and Its Relationship with TSH before and after Levothyroxine Replacement Therapy in Patients with Primary Hypothyroidism. *Biomedicines*, 11(3), 811.
34. Samuels, M. H., & Bernstein, L. J. (2022). Brain fog in hypothyroidism: What is it, how is it measured, and what can be done about it. *Thyroid*, 32(7), 752-763.
35. El Najjar, M., Soliman, S. S., Naidany, S. S. E., El Sawah, M. F., &Zewain, S. K. (2022). Study of fatigue in hypothyroid patients. *Menoufia Medical Journal*, 35(2), 553.
36. Goel, A., Shivaprasad, C., Kolly, A., Pulikkal, A. A., Boppana, R., &Dwarakanath, C. S. (2017). Frequent Occurrence of Faulty Practices, Misconceptions and Lack of Knowledge among Hypothyroid Patients. *Journal of clinical and diagnostic research: JCDR*, 11(7), OC15–OC20.
37. Mitchell, A. L., Hegedüs, L., Žarković, M., Hickey, J. L., &Perros, P. (2021). Patient satisfaction and quality of life in hypothyroidism: An online survey by the british thyroid foundation. *Clinical endocrinology*, 94(3), 513-520.
38. Mostafa, F. S. A., El-Shabrawy, E. M., El Morsy, E. M. A., &Senosy, S. A. (2018). Satisfaction to healthcare among elderly; comparison study between Egypt and Saudi Arabia. *International Journal of Community Medicine and Public Health*, 5(8), 3180.
39. Ruggeri, R. M., Trimarchi, F., & Biondi, B. (2017). Management of endocrine disease: l-thyroxine replacement therapy in the frail elderly: a challenge in clinical practice. *European Journal of endocrinology*, 177(4), R199-R217.
40. Livecchi, R., Coe, A. B., Reyes-Gastelum, D., Banerjee, M., Haymart, M. R., &Papaleontiou, M. (2022). Concurrent Use of Thyroid Hormone Therapy and Interfering Medications in Older US Veterans. *The Journal of clinical endocrinology and metabolism*, 107(7), e2738–e2742.
41. Sabud, D. A., Das, D. A., & Debbarma, D. R. (2022). Efficacy of Individualized homoeopathic intervention in subclinical hypothyroidism: A case report. *Int. J HomSci*, 6(4), 566-572.
42. Arora, R., Mittal, P., Trivedi, J., &Verma, A. (2022). A Cross-Sectional Study to Evaluate Knowledge, Attitude, Practice & Treatment Adherence for Hypothyroidism among Females of North India. *Journal of Pharmaceutical Negative Results*, 5232-5241.
43. Dew, R., King, K., Okosieme, O. E., Pearce, S., Donovan, G., Taylor, P., Leese, G., Hickey, J., Razvi, S., Dayan C.,& Wilkes, S. (2017). Patients' attitudes and perceptions towards treatment of hypothyroidism in general practice: an in-depth qualitative interview study. *BJGP open*, 1(2).

44. Cudris-Torres, L., Alpi, S. V., Barrios-Núñez, Á., Gaviria Arrieta, N., Mejía Gutiérrez, J., Alvis Barranco, L., Rios-Carllys, G., Cuenca-Calderón1, S.E., Bermúdez, V., Hernández-Lalinde, J., RiveiraZuleta, C. A., Bahamón, M. J., Álvarez Herrera J. S., & Álvarez Herrera, J. S. (2023). Quality of life in the older adults: The protective role of self-efficacy in adequate coping in patients with chronic diseases. *Frontiers in Psychology*, 14, 1362.
45. Pawlikowska-Łagód, K., & Suchodolska, M. (2022). Perceptions of Own Illness among the Elderly as Measured by the Brief-IPQ Scale and the IPIS. *International journal of environmental research and public health*, 19(8), 4665.
46. Kilit, I. T. P., Özyiğit, F., & Onbaşı, K. (2022). Is Drug Adherence In Hypothyroidism Treatment Still A Problem?. *Nobel Medicus Journal*, 18(1).
47. El Helou, S., Hallit, S., Awada, S., Al-Hajje, A., Rachidi, S., Bawab, W., Salameh, P., & Zein, S. (2019). Adherence to levothyroxine among patients with hypothyroidism in Lebanon. *EMHJ*, 25(3):149-159.
48. Salih, A., & Ismail, R. M. (2022). Elderly patients' adherence, knowledge and belief to medications in primary healthcare centers in Baghdad. *Saudi J Med*, 7(1), 4-14.
49. Taheri, E., Araban, M., Ghanbari, S., & MoradiKalboland, M. (2022). The Relationship between Health Literacy and Rate of Receiving Integrated and Comprehensive Geriatric Care Program with Self-care Ability in Elderly Women. *Journal of Health Literacy*, 7(1), 45-55.
50. SangSefidi, S., GhanbariMoghaddam, A., Mohamadzadeh, M., Karbalaee, Z., & Mohammadi, M. (2018). Self-care and its predictive role in the quality of life of the elderly living in the community. *Journal of Gerontology*, 3(1), 64-70.
51. Nila, K. M., Mekhana, V. D., & Nair, S. R. (2018). Anxiety, Depression, and self-care management among patients with hypothyroidism. *Asian J Pharma Clin Res*, 11(1), 337-40.
52. Benmaamar, S., Lazar, N., El Harch, I., Diagne, B. J., Chakri, I., Omari, M., Maiouak, M., Qarmiche, N., Otmani, N., Salhi, H., Berraho, M., El Fakir, S., El Ouahabi H., & Tachfouti, N. (2023). Quality of Life among Patients with Hypothyroidism in a Morocco: A Cross-Sectional Study. *Open Access Library Journal*, 10(4), 1-11.
53. Ghamri, R., Babaker, R., Ezzat, S., Alsaedi, H., Alkhamisi, M., Arbaein, R., Alyahya, R., Fayraq, S., & Alyahya II, R. A. (2022). Assessment of quality of life among patients with primary hypothyroidism: a case-control study. *Cureus*, 14(10).
54. Al Quran, T., Bataineh, Z., Al-Mistarehi, A. H., Okour, A., Beni Yonis, O., Khassawneh, A., AbuAwwad, R., & Al Qura'an, A. (2020). Quality of life among patients on levothyroxine: A cross-sectional study. *Annals of medicine and surgery*, 60, 182-187.
55. Recker, S., Voigtländer, R., Viehmann, A., Dunschen, K., Kerp, H., Frank-Raue, K., Leidig-Bruckner, G., Graf, D., Lederbogen, S., Dietrich, J. W., Görges, R., Brabant, G., Völker, U., Watt, T., Zwanziger, D., Moeller, L. C., & Führer, D. (2019). Thyroid related quality of life in elderly with subclinical hypothyroidism and improvement on levothyroxine is distinct from that in young patients (TSAGE). *Hormone and Metabolic Research*, 51(09), 568-574.
56. Salehi, L., & Keikavoosi-Arani, L. (2020). Using the backman model in determining the dimensions of self-care and its factors affecting the elderly in Tehran city, Iran. *Internal Medicine Today*, 26(4), 382-397.
57. Jang, D. E., & Shin, J. H. (2019). Self-care performance of middle-aged stroke patients in Korea. *Clinical nursing research*, 28(3), 263-279.

58. Guo, Y., Wang, T., Ge, T., & Jiang, Q. (2022). Prevalence of self-care disability among older adults in China. *BMC geriatrics*, 22(1), 1-8.
59. Ziaeefer, H., Tajvar, M., Yaseri, M., & Pourreza, A. (2021). Evaluation of elderly's integrated healthcare components in primary healthcare centers of Tehran, Iran. *Journal of Education and Health Promotion*, 10, 222.
60. Rochmawati, E., & Amalia, S. (2021). Self-care Behavior and Frailty Syndrome among Elderly Patients with Heart Failure. *Open Access Macedonian Journal of Medical Sciences*, 9(T4), 231-235.
61. Eimer, S., & Mahmoodi-Shan, G. R. (2020). Self-care Behaviour of the Elderly with Heart Failure and its Associated Factors in Hospitals of GonbadKavus in 2018. *Journal of Research Development in Nursing and Midwifery*, 17(1), 12-21.
62. Avazeh, M., Babaei, N., Farhoudi, S., Kalteh, E. A., & Gholizadeh, B. (2019). The study of self-care and related factors in the elderly with chronic diseases in 2018. *Journal of Health and Care*, 21(2), 135-144.
63. Eknithiset, R., Somrongthong, R., & Kumar, R. (2017). Factors associated with knowledge, perception, and practice toward self-care among elderly patients suffering from Type 2 diabetes mellitus in rural Thailand. *Journal of Ayub Medical College Abbottabad*, 30(1), 107-110.
64. Dural, G., KavakBudak, F., Özdemir, A. A., & Gültekin, A. (2022). Effect of perceived social support on self-care agency and loneliness among elderly Muslim people. *Journal of religion and health*, 61(2), 1505-1513.
65. Shamlou, R., Nikpeyma, N., Pashaeipour, S., Sahebi, L., & Mehrgou, Z. (2021). Relationship of Loneliness and Social Isolation with Self-Care Ability among Older Adults. *Journal of psychosocial nursing and mental health services*, 59(1), 15–20.
66. Nieboer, A. P., Hajema, K., & Cramm, J. M. (2020). Relationships of self-management abilities to loneliness among older people: A cross-sectional study. *BMC geriatrics*, 20, 1-7.
67. Hudiyawati, D., Ainunnisa, K., & Riskamala, G. (2021). Self-care and its related factors among patients with congestive heart failure in Surakarta, Indonesia. *Journal of Medicinal and Chemical Sciences*, 4(4), 364-373.
68. Tekalegn, Y., Addissie, A., Kebede, T., & Ayele, W. (2018). Magnitude of glycemic control and its associated factors among patients with type 2 diabetes at TikurAnbessa Specialized Hospital, Addis Ababa, Ethiopia. *PloS one*, 13(3), e0193442.
69. Zhou, P., Hughes, A. K., Grady, S. C., & Fang, L. (2018). Physical activity and chronic diseases among older people in a mid-size city in China: a longitudinal investigation of bipolar effects. *BMC public health*, 18(1), 486.
70. Araújo-Soares, V., Hankonen, N., Pesseau, J., Rodrigues, A., & Sniehotta, F. F. (2019). Developing Behavior Change Interventions for Self-Management in Chronic Illness: An Integrative Overview. *European psychologist*, 24(1), 7–25.
71. Jung, S. Y., & Moon, K. J. (2023). Factors affecting self-care among community-dwelling hypertensive older adults: A cross-sectional study. *Nursing open*, 10(6), 3892–3905.
72. Ladner, J., Alshurafa, S., Madi, F., Nofal, A., Jayasundera, R., Saba, J., & Audureau, E. (2021). Factors impacting self-management ability in patients with chronic diseases in the United Arab Emirates, 2019. *Journal of Comparative Effectiveness Research*, 11(3), 179-192.
73. Schulman-Green, D., Jaser, S. S., Park, C., & Whittemore, R. (2016). A metasynthesis of factors affecting self-management of chronic illness. *Journal of advanced nursing*, 72(7), 1469-1489.

74. Cramm, J. M., & Nieboer, A. P. (2015). Chronically ill patients' self-management abilities to maintain overall well-being: what is needed to take the next step in the primary care setting?. *BMC family practice*, 16, 1-8.
75. Mohamed, M. A., Shahin, E. S., Elalem, O. M., Hafeze Elemam, F. E., & Sobh Sobeh, D. E. (2022). Is There a Relation Between Illness Perception and Self-Care Maintenance among Patients with Chronic Disease?. *Assiut Scientific Nursing Journal*, 10(30), 198-207.
76. Hu, Y., Liu, H., Wu, J., & Fang, G. (2022). Factors influencing self-care behaviours of patients with type 2 diabetes in China based on the health belief model: a cross-sectional study. *BMJ open*, 12(8), e044369.
77. Kim, S., Kim, E., & Ryu, E. (2019). Illness perceptions, self-care management, and clinical outcomes according to age-group in Korean hemodialysis patients. *International journal of environmental research and public health*, 16(22), 4459.
78. Rakhshan, M., Mirshekari, F., & Dehghanrad, F. (2020). The Relationship between Illness Perception and Self-Care Behaviors among Hemodialysis Patients. *Iranian journal of psychiatry*, 15(2), 150–158.
79. Rivera, E., Corte, C., Steffen, A., DeVon, H. A., Collins, E. G., & McCabe, P. J. (2018). Illness representation and self-care ability in older adults with chronic disease. *Geriatrics*, 3(3), 45.
80. Meraz, R., McGee, J., Ke, W., & Osteen, K. (2023). Resilience mediates the effects of self-care activation and hope on medication adherence in heart failure patients. *Research in Nursing & Health*. 46,(3),323-335
81. Krzemińska, S., Lomper, K., Chudiak, A., Ausili, D., & Uchmanowicz, I. (2021). The association of the level of self-care on adherence to treatment in patients diagnosed with type 2 diabetes. *Acta diabetologica*, 58(4), 437–445.
82. Hancerlioglu, S., Fadiloglu, C., Yildirim, Y., & Aykar, F. S. (2019). The effect of self-care management on compliance with chronic disease. *International Journal of Caring Sciences*, 12(2), 877.