Relationship between the Health Literacy of Geriatric Patients with Chronic Diseases and Their Adherence to the Prescribed Medications

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Abstract: Health literacy is a key determinant of health outcomes, costs and hospital admittances. Despite proved in the literature that adherence to the therapeutic regimen among elders is one of the most substantial health management conducts that is influenced by health literacy, little empirical attention is paid to this relation in Egypt. This study intended to determine the degree of health literary of geriatric patients suffering from chronic diseases and its relation to patients' adherence to the recommended therapeutic regimens. The study followed a descriptive correlational research design and was carried out in the Alexandria Health Insurance outpatient units of Gamal Abd El Naser Hospital, Alexandria, Egypt. 184 geriatric patients were involved in the study. Five tools were selected to collect the necessary data; Short Portable Mental Status Questionnaire, Socio-Demographic and Clinical Data of Geriatric Patients with Chronic Diseases Structured Interview Schedule, The European Health Literacy Survey Questionnaire- short version (HLS-EU-Q16 questionnaire), The Swedish Functional Health Literacy Scale (S-FHL scale) and Morisky Medication Adherence Scale (MMAS). The study revealed that only 10.3% of the present study subjects were considered to be highly adherent with their medication. 32.0% of them had sufficient CHL while 10.9% had sufficient FHL. A highly positive statistically significant relation was evident between the degree of health literacy (CHL and FHL) and the medication adherence level of the geriatric patients. Conclusion: a highly positive statistically significant relation is found between health literacy and geriatric patients' adherence to medication regimens. The great percentage of the current study geriatric patients had inadequate FHL, inadequate and problematic CHL and lower medication adherence. Recommendations: an in-service health education programs for nurses and health care professionals at different healthcare settings on how to deliver health-related information to elders with limited HL must be developed to guarantee the delivery of quality patient care.

Key words: Adherence to Recommended Medications · Chronic Diseases · Geriatric Patients · Health Literacy.

INTRODUCTION

Like many countries around the world, the Egyptian older adults' population is growing rapidly [1]. Increasing longevity can be expected to result in multi-morbidity in ageing populations, the national council on aging (2017) [2], had reported that 80% of elders are minimally diagnosed with one chronic illness and nearly 70% of them suffer from two or more. Chronic diseases are characterized by slow progression and long duration. Therefore, the clinical presentations and burden of the illness adversely affect the older adults' health domains [3]. Multi-morbidity in elders requires multiple medication prescriptions. Studies showed that 42.5-77% of the world's older population takes five or more

medicines [2, 4]. In line with this situation, a study to determine the dissemination of polypharmacy and improper medication intake among 395 elderly persons (≥60 years) in rural areas of Egypt had shown that polypharmacy (Defined as intake of 5 or more drugs) was 56 % [5].

Medications are key determinants for improving and maintaining healthy living conditions. This can be discontented when patients do not follow their prescribed medication- related instructions and become non adherent. Inability to adhere to medication regimens can happen at any time during treatment and is, unfortunately, not an infrequent problem [6]. Researchers have found that medication non-adherence is a prevalent health care issue among geriatrics than younger age groups

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[6-12]. The world health organization (WHO) [13], had categorized the potential factors of non-adherence into five- related factors; therapeutic regimen, patient condition, healthcare-team or medical system, social/economic factor in addition to insufficient health literacy as an integral but ignored patient- related barrier.

The innovative current philosophy for successful and productive aging is directed towards health management by actively making an appropriate health decision, locating sufficient medical resources and acquiring adequate disease-related consultations. This newly trended approach in illnesses intervention is extended beyond the traditional concept of just understanding basic health terminology, to the highly efficacy in older adult's self-comprehending medical instructions, which is termed as health literacy [14]. It was documented that older population had poorer health literacy skills than younger adults [14]. The Institute of Medicine's (IOM) latest registry [15], pointed to that the majority of adult in the United States suffering from difficult understanding and dealing with heath care materials.

Health literacy is known as the degree to which people have the capability to get, process and comprehend essential health information and services necessary to make an informed health care decisions [16]. Approximately, functional and comprehensive health literacy are the communal types of health literacy conveyed in the literature [17]. Functional health literacy (FHL) embraces individuals' ability to read information and remarks concerning health that helps them to properly function as a patient in the health sector [17, 18]. However Comprehensive health literacy (CHL), is defined by Sorensen *et al*. [19] as "…links to literacy that entails people's knowledge, motivation and competences to access, understand, appraise and apply health information in order to make judgments and decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course". Functional HL is a highly fundamental phenomenon as compared with comprehensive HL, which includes a diversity of skills, not only related to people's physical functions but also to communicative and interaction skills [17].

Health literacy is imperative to the health and welfare of older adults. Every day, they must comprehend different kinds of spoken and written speech concerning their health, for sustaining and promoting health. It is critical for older adults to clearly understand directions for taking certain medications; indication of drug, action and side effects and nutrients and drug interactions. However, failure to understand administration advices, limited information regarding adverse drug reactions, interactions and efficacy of specific therapies, in addition to overall uncertainties about disease management and medications will reduce one's capacity to achieve health and consequently persons age less successfully [6, 20].

There are numerous diverse ageing alterations that can lessen health literacy skills among older adults. These include: changes in cognitive ability which may decrease older adult's ability to understand and/ or retrieve new information; hearing and vision deficits may also impair the ability to act upon health information. Furthermore psychosocial issues as loneliness and anxiety may adversely impact understanding of health materials [21]. Those above mentioned age related changes alongside with differences in education levels, the difficulty and the technical nature of health information could compromise older adults' capacity to process health information and make sense of messages [22]. Older adults with inadequate health literacy skills are subjected to a wide range of adverse health consequences including impaired physical and mental health, increased hospital admittances especially emergency care units, decreased use of preventive health services and higher mortality rates. Those older adults also, had less information on their diseases, less self-care, poor self-management skills, lower adherence to recommended treatment and medical instructions from health care providers, under reporting of health problems and inability to make healthcare decisions [23-25].

Because of the substantial influence of reduced health literacy on medication adherence, it has been considered as one of the ten national priorities to promote medication adherence in the USA. Moreover, the association between health literacy and medication adherence has been made a research priority by the US Department of Health and Human Services, IOM, the National Institutes of Health, the American Medical Association and the Centers for Disease Control and Prevention[6]. Despite proved in the literature that adherence to the therapeutic regimen among elders is one of the most substantial health management conducts that is influenced by health literacy [6] little empirical attention is paid to this relation. To our knowledge, In Egypt, no study has been proceeded to explore neither health literacy nor its relation with medication adherence among older adults. Those display the fastest increased portion of population, who suffer from multiple comorbidities and concomitant several medication prescriptions and the

larger consumer of heath care services. In the present research paper investigating the association between health literacy and medication adherence will help health care professionals including the gerontological nurse to institute appropriate, individualized reliable health literacy interventions for geriatric population to facilitate management of their often-complex medication regimens. In addition to, reduce risks of additional co-morbidity and promote wellbeing through improving disease control process.

Aim of the Study: To evaluate the level of health literary of geriatric patients with chronic diseases and its relation to geriatric patients' adherence to the prescribed medication regimens.

Research Questions:
- What are the health literacy levels of geriatric patients with chronic illnesses?
- Is there a relation between geriatric patients' health literacy and adherence to the prescribed medication regimens?

MATERIALS AND METHODS

Study Design: A descriptive correlational research design was utilized.

Setting: The present study was proceeded in the Alexandria Health Insurance outpatient department of Gamal Abd El Naser Hospital, Alexandria, Egypt. These clinics include medical, cardiac, urology, neurology, dental and orthopedic clinics. The clinics work from 8 A.M to 5 PM for 6 days per week. The geriatric patients' attendance rate of these clinics per three months was 350 geriatric patients.

Subjects: The study comprised a convenience sample of 184 geriatric patients aged 60 years and above, able to write and read, have no or mild cognitive impairment, suffered from one chronic illness at least, consumes minimally one medication, able to communicate and agreed to share in the research.

The number of the study participants was counted using the EPI info 0.7 program following the statistical parameters; population size 350 over three months, expected frequency =50%, acceptable error=10%, confidence coefficient=99%, minimal sample size =184 geriatric patient.

Tools: Five tools were selected to get the necessary data:

Pre-Inclusion Assessment Using Tools I
Tool (I): Short Portable Mental Status Questionnaire (SPMSQ): The short portable mental status questionnaire was developed by Pfeiffer [26] and this scale is widely used to measure mental impairments and determine its degree. The scale was transformed into Arabic language and tested for validity and reliability by Mahrous [27] in Egypt. The Arabic version of this scale was used to include those with no or mild cognitive impairment. The scale composed of 10 items and summed 10 points, the scoring from 0-2 are considered to have no cognitive impairment; scoring from 3-4 indicates mild cognitive impairment.

Tool (II): Socio-Demographic and Clinical Data of Geriatric Patients with Chronic Diseases Structured Interview Schedule: This tool was established by the researchers based on review of related literature, it contained 3 sections:
- **A:** Socio-demographic data of the older adults: It includes the socio-demographic characteristics of the elders such as age, sex, social status, income and educational level.
- **B:** Clinical data such as medical diagnosis, number and duration of chronic diseases and the perception toward health.
- **C:** Treatment regimen as the type and number of consumed medications, daily pill count, assistance with medication administration and side effects of medication.

Health literacy of the study participants was evaluated using tool III and IV
Tool (III): The European Health Literacy Survey Questionnaire-Short Version (HLS-EU-Q16 Questionnaire) [28]: The HLS-EU Q16 form entails 16 items selected from the HLS-EUQ 47. It is one of the limited tools trying to capture numerous HL aspects. It composed of three sub-domains as follows: "Health Care (HC)", "Disease Prevention (DP)", "Health Promotion (HP)" [29]. The items of (HLS-EU-Q16) are concentrating on four HL magnitudes: capability to access/get health information, comprehend health information (Either written or spoken), ability to process/evaluate health information and ability to implement/use health information. This tool was selected for the current research because it is short and easy for older adults.

The (HLS-EU-Q16) response categories are, 'Very easy', 'Fairly easy', 'Fairly difficult' and 'Very difficult' with the option to give an answer of 'Do not know' to be marked by the researcher if the respondent didn't know and analyzed in the same way as not answering the question. Following the manual for the instrument, the response categories were dichotomized [30]. By way of, the responses "Fairly easy" and "Very easy" were grouped into one category, which was given the value of 1, the responses "Fairly difficult" and "Very difficult" were grouped into another category which was given the value of 0 and the response "Don't know" was treated as missing. Every study older participant could score between 0 and 16 points, in which zero denoted the lowest possible CHL level and 16 denoted the highest possible level. Next, the total score of the response values was calculated and allocated into three classifications: Scores equal to or more than 13 denoted sufficient HL, scores from 9 to 12 denoted problematic HL and scores less than or equal to 8 denoted inadequate HL. In the current study, the Arabic version of the modified European Health Literacy Survey Questionnaire-short version (HLS-EU-Q16) was used to assess comprehensive health literacy (CHL) of the study older adults [31].

Tool (IV): The Swedish functional health literacy scale (S-FHL Scale): The (S-FHL scale) was used to assess FHL, i.e. the ability to read information and instructions about health to improve and maintain health. It consists of five items assessing different aspects of FHL and having the same five semi-structured response categories: never, seldom, sometimes, often and always [32]. The global level of FHL for each study participant was calculated and classified into three response categories of FHL: sufficient, problematic and inadequate. Older adult participants who reacted with "Never" or "Seldom" to all questions were classified as having sufficient FHL. Older participants recording "Often" or "Always" to one or more of the five questions were considered as having inadequate FHL. While others who answered "Sometimes" to at least one question and not answered "Often" or "Always" to any other questions, were categorized as having problematic HL.

The scale is suitable for conducting the present study because it is short, easy to administer, has a validated Arabic version and has been used previously in Egypt by other researchers [31]. The Arabic version of the S-FHL scale was used to assess FHL.

Medication adherence was assessed by tool V
Tool (V): Morisky Medication Adherence Scale (MMAS): The Arabic version of the *MMAS* [33] was used to determine the level of medication adherence among the study participants. The MMAS constitutes eight items questionnaire which include seven yes/no questions and the eighth question responded on a 5-point Likert scale. According to the scoring system for the MMAS, the total score of eight represents high level of adherence, the score of six to less than eight denotes medium adherence level and a total score of less than six means low level of adherence. Patients who had low or a moderate level of adherence were counted as non-adherent.

Methods:
- The study protocol was approved by the Ethical Research Committee at the Faculty of Nursing-Alexandria University and the permission of the outpatient clinics' administration to carry out the study was taken after clarification of the purpose of the study, the date and time of data collection.
- The research tools were prepared either established by the researchers (i.e. tool II) or adopted (i.e. tool I, III, IV and tool V).
- The developed tool was tested for content validity by five experts and the adopted tools were already tested for reliability in previous studies.
- A pilot study was carried out on 20 geriatric patients not included in the study sample to assess the applicability, clarity and feasibility of the study tools and also to estimate the time needed to complete the study tools. Based on the pilot study findings, the needed modifications were done.
- The Arabic version of tool I (Short Portable Mental Status Questionnaire (SPMSQ) was used to exclude those older adults with moderate and severe cognitive impairment.
- Each older adult who fulfills the inclusion criteria was interviewed individually by the researchers in the waiting area of the outpatient clinics while sitting comfortably, the researchers explained the purpose of the study in order to gain the geriatric patients' cooperation, then the necessary data was collected.
- The researchers used to attend the selected clinics from 8.00 am to 5 pm on all 6 working days of the clinics.
- Collection of data covered a period of 3 months from the beginning of November 2017 to the end of January 2018.

Ethical Considerations: An informed written consent was obtained from the older adults to participate in the study after explanation of the study purpose and its potential benefits. Issues related to Privacy/ anonymity of the geriatric patients and confidentiality of the collected data was maintained.

Limitations of the Study: Some communication difficulties were encountered by the researchers during the process of data collection caused by overcrowded and noisy environment as the outpatient clinics serve large number of people of all age groups, in addition to, interruptions from other patients. Furthermore, selection of geriatric patients who are able to read and write was not an easy and was time consuming task as it leads to terminating communication with patients which, was very embarrassing.

Statistical Analysis of the Data: After data were collected it was revised, coded and fed to statistical software SPSS version 20.0 for analysis of the data.. Quantitative data were described using; number, percent, mean and standard deviation. Frequency tables and cross tabulations were used to illustrate the results of categorical data. Comparison of means was done by Student t-test and One-Way Analysis of Variance (ANOVA). Significance of the obtained results was judged at the 5% level.

RESULTS

Table (1) displays a detailed description of the studied older adults' socio-demographic characteristics. The mean age of older adults was 67.7±5.9 years and the greatest percentages (78.8%) of them were male and married (73.9%). Around one third (31.5%) of older adults were university graduates and near percentages 17.9 and17.4% of them could just read and write or completed their basic education respectively. Nearly two thirds (65.8%) of them were employees and the majority of them (85.9%) reported insufficient monthly income.

As shown in Table (2), the greatest percentage (64.7%) of the older adults suffered from hypertension, followed by 38.0, 36.4 and 29.9% suffered from heart diseases, diabetes mellitus and musculoskeletal disorders respectively. More than one half (58.20%) of older adults rated their health as being reasonable and one fourth (25.0%) as being good, while only 16.8% perceived bad health.

Table 1: Distribution of the studied older adults according to their socio-demographic characteristics

Socio-demographic characteristics	Frequency (n=184)	Percent (%)
Age (In years):		
60-	112	60.9
70-	62	33.7
80 and more	10	5.4
Mean ± SD	67.7±5.9 year	
Sex :		
Male	145	78.8
Female	39	21.2
Marital status:		
Married	136	73.9
Widow	45	24.5
Divorced	2	1.1
Single	1	0.5
Level of education:		
Read and write	33	17.9
basic education	32	17.4
Secondary or intermediate education	46	25
Above average	15	8.2
University	58	31.5
Occupation before retirement:		
Employee/professional	121	65.8
Trader/Free business	26	14.1
Housewife	20	10.9
Manual worker	14	7.6
Not working	3	1.6
Monthly income:		
Not Enough	158	85.9
Enough	26	14.1
Source of income:		
Pension	178	96.7
Sons and daughters	3	1.6
Current work	3	1.6

Table 2: Distribution of the study older adults according to their health-related characteristics

Health-related characteristics of the older adults	Frequency (n=184)	Percent (%)
1- Type of health problem #		
- Hypertension	119	64.7
- Heart diseases	70	38
- DM	67	36.4
- Musculoskeletal disorders	55	29.9
- GIT disorders	44	23.9
- Renal disorders	36	19.6
- Respiratory	21	11.4
- Stroke	15	8.2
- Blood disorders	3	1.6
2- Self-evaluation for health		
Good	46	25
Moderate (reasonable)	107	58.2
Bad	31	16.8

More than one answer

Table 3: Distribution of the studied older adults according to their medication related characteristics

| Medication related characteristics	Frequency (n=184)	Percent (%)
A. Number of consumed medication/day		
One	9	4.9
Two	23	12.5
Three	30	16.3
Four and more	122	66.3
B. Type of consumed medication #		
Antihypertensive drugs	120	65.2
Medication for heart diseases	68	37
Hypoglycemic drugs	67	36.4
Drugs for musculoskeletal disorders	59	32.1
Drugs for GIT disorders	46	25
Drugs for renal disorders	36	19.6
Drugs for respiratory disorders	22	12
Drugs for blood disorders	21	11.4
Drugs for stroke	11	6
C. Place of obtaining medications #		
Health insurance pharmacy	167	90.8
Private pharmacy	17	9.2
D. Consumption of more than one drug at the same time		
Yes	163	88.6
No	21	11.4
E. Number of medication doses/day (daily pill count) Mean ± SD = 7.8±5.1		
F. Assistance with medication administration		
Yes	54	29.3
No	130	70.7
G. Presence of medication side effects		
Yes	82	44.6
No	102	55.4

More than one answer
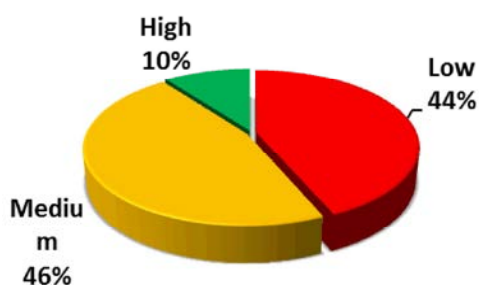
Fig. 1: The older adults' level of medication adherence based on their responses to the Morisky Medication Adherence Scale (MMAS).

Table (3) presents that more than two thirds (66.3%) of older adults consumed four or more medication per day. The greatest percentage (65.2%) of them consumed antihypertensive medications, followed by 37.0, 36.4 and 32.1% consumed medications for treating heart diseases, diabetes mellitus and musculoskeletal disorders respectively. The majority of them (90.8%) obtain those medications from the health insurance pharmacy. While 88.6% of them reported consumption of more than one medication at the same time with a mean medication doses (7.8±5.1) taken on daily basis. Only 29.3% of older adults reported receiving help in medication administration, compared to 70.7% who take their medications independently. Nearly one half (44.6%) of older adults experienced medication side effects.

According to the scoring system of the MMAS, Fig., (1) makes clear that only 10% of older adults participants were considered to be highly adherent with their medication and the majority of them were non adherent (Those with moderate (46%) or low adherence level (44%)).

Table (4) portrays that nearly one third (32.0%) of the study older adults had sufficient CHL while 31.0 and 37.0% of them had inadequate or problematic CHL health literacy respectively. On the other hand, more than two thirds (69.6%) of the study older adults had inadequate FHL and nearly one fifth (19.6%) of them had problematic FHL compared to only 10.9% of the study older adults had sufficient FHL.

Table 4: Distribution of older adults according to the level of Comprehensive health literacy (CHL) and functional health literacy (FHL)

	Level of CHL			Level of FHL		
	Inadequate CHL	Problematic CHL	Sufficient CHL	Inadequate FHL	Problematic FHL	Sufficient FHL
Frequency (n=184)	57	68	59	128	36	20
Percent (%)	31.0	37.0	32.0	69.6	19.6	10.9

Table 5: Relation between the level of both medication adherence and health literacy of the studied older adults and their sociodemographic characteristics

Socio-demographic characteristics	Medication adherence level						Test of significance	Comprehensive health literacy						Test of significance	Functional health literacy						Test of significance
	Low		Medium		High			Inadequate		Problematic		Sufficient			Inadequate		Problematic		Sufficient		
	No	%	No	%	No	%		No	%	No	%	No	%		No	%	No	%	No	%	
Sex																					
Male	65	44.8	63	43.4	17	11.7	X²: 2.699 P: .550	38	26.2	58	40.0	49	33.8	X²: 7.379 P:.025*	98	67.6	30	20.7	17	11.7	X²: 1.287 P:.525
Female	15	38.5	22	56.4	2	5.1		19	48.7	10	25.6	10	25.6		30	76.9	6	15.4	3	7.7	
Age (Years)																					
60 -	50	44.6	54	48.2	8	7.1	X²: 10.460 P: .033*	39	34.8	40	35.7	33	29.5	X²: 6.051 P:.195	77	68.8	24	21.4	11	9.8	X²:3.550 P:.470
70 -	28	45.2	23	37.1	11	17.7		15	24.2	22	35.5	25	40.3		44	71.0	9	14.5	9	14.5	
80 and more	2	20.0	8	80.0	0	0.0		3	30.0	6	60.0	1	10.0		7	70.0	3	30.0	0	0.0	
Educational level																					
Read and write	10	30.3	18	54.5	5	15.2	X²: 10.509 P: .397	19	57.6	14	42.4	0	0.0	X²: 65.463 P:.0.001*	32	97.0	1	3.0	0	0.0	X²: 60.920 P:.0.001*
Basic education	15	46.9	16	50.0	1	3.1		17	53.1	12	37.5	3	9.4		29	90.6	3	9.4	0	0.0	
Secondary	22	47.8	21	45.7	3	6.5		13	28.3	21	45.7	12	26.1		36	78.3	8	17.4	2	4.3	
Above average	4	26.7	8	53.3	3	20.0		3	20.0	4	26.7	8	53.3		9	60.0	5	33.3	1	6.7	
University	28	50.9	20	36.4	7	12.7		4	7.3	15	27.3	36	65.5		19	34.5	19	34.5	17	30.9	
Post	1	33.3	2	66.7	0	0.0		1	33.3	2	66.7	0	0.0		3	100.0	0	0.0	0	0.0	
Marital status Single	0	0.0	1	100.0	0	0.0	X²:3.811 P: .702	1	100.0	0	0.0	0	0.0	X²: 16.045 P:0.014*	1	100.0	0	0.0	0	0.0	X²: 8.134 P:.250
Married	59	43.4	63	46.3	14	10.3		40	29.4	45	33.1	51	37.5		87	64.0	31	22.8	18	13.2	
Divorce	2	100.0	0	0.0	0	0.0		0	0.0	0	0.0	2	100.0		2	100.0	0	0.0	0	0.0	
Widow	19	42.2	21	46.7	5	11.1		16	35.6	23	51.1	6	13.3		38	84.4	5	11.1	2	4.4	
Working																					
Not working	1	33.3	2	66.7	0	0.0	X²: 11.091 P:.197	1	33.3	2	66.7	0	0.0	X²: 17.619 P:0.024*	3	100.0	0	0.0	0	0.0	X²: 12.794 P:0.119
Housewife	7	35.0	13	65.0	0	0.0		11	55.0	7	35.0	2	10.0		18	90.0	2	10.0	0	0.0	
Employee	57	47.1	51	42.1	13	10.7		30	24.8	45	37.2	46	38.0		76	62.8	27	22.3	18	14.9	
Manual worker	5	35.7	5	35.7	4	28.6		8	57.1	5	35.7	1	7.1		13	92.9	1	7.1	0	0.0	
Free business	10	38.5	14	53.8	2	7.7		7	26.9	9	34.6	10	38.5		18	69.2	6	23.1	2	7.7	
Income																					
Enough	12	46.2	11	42.3	3	11.5	X²:.192 P:.908	5	19.2	8	30.8	13	50.0	X²: 4.700 P:.095	15	57.7	7	26.9	4	15.4	X²: 2.019 P:.383
Not enough	68	43.0	74	46.8	16	10.1		52	32.9	60	38.0	46	29.1		113	71.5	29	18.4	16	10.1	

According to Table (5), there are positive statistical significant relations between the level of comprehensive health literacy (CHL) of the studied elders and their sex (p= 0.025), educational level (p= 0.001), marital statues (p=0.014) and working condition (p=0.024). On the other hand, statistical significant relations are not detected between the level of medication adherence of the studied elders and their sociodemographic characteristics except for age (p=0.033). The same picture was noted again in the relation between the sociodemographic characteristics and functional health literacy (FHL), as there is no statistical significant relation except for the educational level (p=0.001).

As Table (6) illustrates, there are positive statistical significant relations between the number of the experienced health problems and the level of medication adherence (p=0.036) from one hand and functional heath literacy (p=0.54) from the other hand. Consistently the degree of the studied older adults' evaluation to their health condition was significantly related to their level of medication adherence (p=0.014) and the degree of both comprehensive and functional health literacy (p=0.002 and 0.054) respectively.

Table 6: Relation between geriatric patient health-related characteristics and the level of both medication adherence and health literacy

Health-related characteristics	Medication adherence level							Comprehensive health literacy							Functional health literacy scale						
	Low		Medium		High		Test of significance	Problematic		Sufficient		Inadequate		Test of significance	Problematic		Sufficient				Test of significance
	No	%	No	%	No	%		No	%	No	%	No	%		No	%	No	%	No	%	
Numbers of health problems																					
One	9	81.8	2	18.2	0	0.0	X²: 9.218 P:.036*	3	27.3	4	36.4	4	36.4	X²: 2.794 P:.593	5	45.5	5	45.5	1	9.1	X²: 8.566 P:.054*
Two	27	45.8	24	40.7	8	13.6		20	33.9	17	28.8	22	37.3		37	62.7	15	25.4	7	11.9	
Three or more	44	38.6	59	51.8	11	9.6		34	29.8	47	41.2	33	28.9		86	75.4	16	14.0	12	10.5	
Self-evaluation for health																					
Good	27	58.7	16	34.8	3	6.5	X²: 7.293 P:.014*	8	17.4	15	32.6	23	50.0	X²: 17.520 P:0.002*	25	54.3	15	32.6	6	13.0	X²: 9.261 P:.054*
Moderate	44	41.1	51	47.7	12	11.2		32	29.9	43	40.2	32	29.9		77	72.0	18	16.8	12	11.2	
Bad	9	29.0	18	58.1	4	12.9		17	54.8	10	32.3	4	12.9		26	83.9	3	9.7	2	6.5	

Table 7: Relationship between the geriatric patients' health literacy level and medication adherence

Medication adherence level	Comprehensive health literacy							Functional health literacy						
	Inadequate HL		Problematic HL		Sufficient HL		Test of significance	Inadequate		Problematic		Sufficient		Test of significance
	No	%	No	%	No	%		No	%	No	%	No	%	
Low	17	21.2	26	32.5	37	46.2	X²: 21.300 P: ≤.001*	47	58.8	20	25.0	13	16.2	X²: 13.949 P: .007*
Medium	35	41.2	37	43.5	13	15.3		67	78.8	15	17.6	3	3.5	
High	5	26.3	5	26.3	9	47.4		14	73.7	1	5.3	4	21.1	

Table (7) illustrates the relationship between geriatric patients' health literacy level and medication adherence. The table reveals a highly positive statistically significant relation between the level of health literacy (CHL (p=0.001) and FHL (p=0.007)) and the medication adherence level of the studied geriatric patients.

DISCUSSION

Health literacy skills involve more than the fundamental writing and reading skills, although reading ability and education influence health literacy. Any person can have inadequate health literacy, including individuals with high literacy skills. Most people will have difficulty understanding health information at any period in their lives [34]. In today's sophisticated health care system, health literacy may involve the ability to get and implement relevant information, understand visual information, operate a computer, search the Internet and appraise websites, calculate or reason numerically and interact with health professionals [35]. Health literacy is a key determinant of health outcomes, costs and hospital admittances. However, gaps in the literature persist on the relationship between health literacy and different health conducts including adherence to therapeutic regimens. To our knowledge, In Egypt, only two prior studies addressed the problem of health literacy in Ain Shams University [31-36] however, none of them has examined the association between health literacy and medication adherence in older adults.

In the current study, according to HLS-EU-Q16, just nearly one third (32%) of older adults showed sufficient comprehensive health literacy (CHL) and the remaining percent had either inadequate CHL (31%) or problematic CHL (37%). This means diminished older adult's ability to access, comprehend, critic and use health information which is necessary to make everyday life decisions concerning healthcare and participation in disease prevention and health promoting activities. This may be explained by age related decrease in sensory, perceptual and cognitive abilities. In addition to, social and functional limitations which may challenge older adult's ability to get comprehend and process health information. Also inadequate CHL may be indebted to inadequate FHL, as appeared in the current study, the higher percentage of older adults was found to have inadequate FHL (69%). In the same line, Wangdahl et al. [30] had concluded that, people with inadequate FHL had greater risk of having insufficient CHL. Arguably, those with limited FHL had limited ability to read the health information and directions that are required to act effectively as a patient in the health care system. An explanation of this inadequacy might be that, comprehension and dealing with health information needs

a considerable reading, calculating and executive ability, which may be altered by normal age related changes in the sensory and cognitive functions, inappropriate presentation of such information, for example writing the medications pamphlet into small prints or sophisticated languages. This finding of limited health literacy skills of the present study participants is consistent with the finding of Agarwal *el al*. [37] who reported that, more than 80% of older adult participants in their study demonstrated below adequate functional health literacy levels as determined by the NVS-UK assessment tool. In addition, the report of the Canadian Council on Learning [38] declared that only 12% of older adults has adequate health literacy skills. Another Iranian study (2011) found that around seventy nine percent of older people had insufficient health literacy [39]. In Saudi Arabia (2017), the degree of misunderstanding of the medication labels was the worst among older age participants due to inadequate health literacy [40].

Numerous explanations for low health literacy among the elderly were stated in the literature including: the increased incidence of dementing state and additional physical illnesses, increased sensory or perceptual deficits, increased levels of emotional disturbance, physical illnesses and limited participation in reading activities [41].

The present research discovered a statistically significant relation between health literacy and medication adherence. Where older population with sufficient health literacy exhibited higher medication adherence level (Table 7). The cause may be that, sufficient health literacy talents assist an individual to comprehend their prescribed drug instructions, recognize the efficacy of the prescribed medication in treating their chronic conditions and appreciate the significance of adherence behaviors in improving their health status. Along with this, Berkman *et al*. [42] had declared that those with limited FHL have more difficulties interpreting health messages and labels on medicines and to a lesser degree follow proposed treatments compared with those with higher FHL. Extra research displays that those with inadequate CHL often have more difficulties in communicating with healthcare providers [43]. The identified associations between health literacy and medication adherence are in agreement with the findings of a study done in Korea (2015), which concluded that, health literacy is the strongest forecaster of medication adherence in geriatric patients [44]. Furthermore, the multivariable analysis done by Noureldin *et al*. [45] had supported the association between health literacy and medication adherence in older patients with cardiac failure.

However, some studies did not find significant statistical associations between health literacy and medication adherence [46] furthermore, Zhang *et al*. [47] in their meta-analysis to systemically examine the relationship between health literacy and medication adherence, found that higher health literacy levels are associated with better medication adherence across 6 diseases and 35 samples. However, the magnitude of this relation was not strong in comparison with other determinants of medication adherence, such as disease, medication beliefs and financial restraints. They clarified that this weak relationship may be related to, not all non-adherent conducts are linked to patient information, literacy factors and patient understanding of written and oral resources. On the other hand, the systematic meta-review of Geboers *et al*. [48] determined a presence of relatively weak evidence on the relationship between health literacy and adherence in older adults. Moreover, most of the researches included in the reviews done by Loke *et al*. [49] and Keller *et al*. [50] similarly did not find significant associations between health literacy and medication adherence in older adults. Gellad *et al*. [12] and Lewis [51] in their researches about correlates of medication adherence, detected that, health literacy is a predictive factor. However, neither concluded that health literacy is a significant challenge for medication adherence. The inconsistent results on the association between health literacy and medication adherence may be linked to different research settings and use of different measures of health literacy. Geboers *et al*. [48] clarified that the two most commonly used measurement tools for health literacy in research are the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Short Test of Functional Health Literacy in Adults (S TOFHLA). These tools have been critiqued for not sufficiently covering the range of skills required for sufficient health literacy and measure limited different constituents of health literacy [52]. Correspondingly, several measures of adherence are based on self-report, however it has been documented that self-reporting is not usually a precise measure of adherence due to people overrating their adherence, especially when their actual adherence is poor [53].

Concerning the prevalence of medication adherence, according to the scoring system of the MMAS, only 10.3% of older adults participants were considered to be highly adherent with their medication and the remaining of older adults were non adherent (Those with moderate or low adherence level). This attributed to the fact that more than two thirds (66.3%) of the current study's participants were consuming four or more types of medication per day and the majority of them (88.6%) had reported consumption of more than one medication at the

same time with a mean medication doses (7.8±5.1) taken on daily basis, Table (3). This complex medication regimen may increase misapprehension of medication instructions, thus not following them properly. This result is in line with the result of a study done in the USA [54] which estimated that only 50% of American adults are properly adhere to their medications. Lee *et al.* [44] and Son *et al*. [55] estimated that only 30.6% and 39.7% of older patients were highly adherent to medications respectively. In addition, a study done by Yasein *et al*. [56] found that almost two-third of the 400 elder participants in their study, did not take medications in a correct manner.

Perception of health by these study participants was significantly associated to their level of medication adherence from one hand and both CHL and FHL levels on the other hand. The findings of Lee *et al*. [44] reinforced the association between health perception and medication adherence. In the same line, Wangdahl *et al*. [57] reported that limited CHL was connected with Poor self-perceived health. Also, further researches done in the year 2016 by Sorensen *et al*. [19] and Palumbo *et al*. [58] supported these relations. Another study done in Iran 2012 indicated that health literacy was linked to good self-rated health status [39]. A study done in Kosovo [59] concluded that Low health literacy degree among elders is associated to poorer self-rated health.

With regard to the linkage between demographic variables and the level of health literacy of the participants, Consistent with the preceding literature, we found a significant associations between CHL level and Sex (p= 0.025), marital status (p=0.014) and working condition (p=0.024) of the study participants [24, 39, 60]. However, education was significantly associated with both FHL and CHL levels (p= 0.001). High educated older adults' demonstrated higher levels of CHL and FHL. Similar finding was obtained by Kutner *et al*. [14], Owen-Smith *et al*. [60] and Von Wagnr *et al*. [61]. Furthermore, Wangdahl *et al*. [30] concluded that Immigrants with low educational level had a statistically significant risk to inadequate functional health literacy. Conversely, there are also studies screening that this relation is not at all times valid [62]. Based on IOM reports, above than half of the highly educated persons had low level of health literacy [63]. Persons displaying sufficient literacy skills at home or work place may not exhibit the same level of health literacy skills [64]. Finally, there is an emerging need to find imperative interventions for the problem of inadequate level of health literacy among the elders which announced to be associated with numerous unwanted health related outcomes as lower medication adherence.

CONCLUSIONS

There is a highly positive statistically significant relation between the level of health literacy and adherence of the geriatric patients' to their medication regimens. The great percentage of the study geriatric patients had inadequate FHL and inadequate and problematic CHL. Nearly ten percent of the elders was considered to be highly adherent with their medications. Furthermore, significant statistical relations were emerged between CHL and sex, educational level, marital status and working condition of the present study elders.

Recommendations:
- Develop an in-service health education programs for nurses and health care professionals at different healthcare settings on how to deliver health information to elders with limited HL skills.
- Plan specific nursing actions to enhance the level of medication adherence in elders with long term disease, paying particular attention to their health literacy skills.
- Design health-related educational leaflets and posters using simple, familiar words with clearly expressed meanings and visual information about long term disease management that should be available in all patients' waiting areas, to increase health literacy skills of older adults.
- A clinical screening tool of health literacy specified for elders is needed to be developed, validated and standardized to detect those who might need specific assistance during the disease management process.
- Pharmaceutical companies should be inspired to develop medication leaflets at lower literacy levels to ensure comprehension of drug regimen.

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