

Association of elderly age and chronic illnesses: Role of gender as a risk factor

**Bandar Alhumaidi Alharbi^{1,2}, Nazish Masud^{1,3}, Fahad Abdullah Alajlan^{1,2},
Nwaf Ibrahim Alkhanein^{1,2}, Fares Thamer Alzahrani^{1,2}, Zaid Majed Almajed^{1,2},
Reema Khalid Mohammed Alessa^{1,2}, Ali Ibrahim Al-Farhan^{1,4}**

¹King Abdullah International Medical and Research Center, ²College of Medicine, King Saud Bin Abdulaziz University for Health Sciences, ³Department of Medical Education, College of Medicine, King Saud bin Abdulaziz University for Health Sciences, ⁴Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia

ABSTRACT

Background and Aims: Chronic diseases are the leading cause of death as well as disability worldwide. There is a little information about the prevalence of these diseases among Saudi elderly population. The aim of the study was to assess the role of gender as risk factor for chronic diseases among elderly patients seen at primary health care centers and identify the most common chronic comorbidities among the elderly. **Methods:** A cross-sectional study was conducted by reviewing charts of elderly patients having chronic illnesses seeking consultation between January to December 2016. Based on WHO classification data for 19 chronic diseases were extracted using electronic charts of the patients. Chi-square test and logistic regression was used to access the gender as predictor for chronic illnesses with statistical significance was set at $P < 0.05$. **Results:** The total number 319 elderly patients were included in the study after random sampling with a mean age of 75 ± 7 years. Around 83 (26%) of patients were severely obese (BMI >35) with a mean BMI of 30 ± 6.7 . The most common chronic illnesses were cardiovascular diseases 229 (71.8%), dyslipidemia 183 (57.4%) and diabetes 179 (56.1%). The chronic respiratory and endocrine diseases were common among the elderly females (P value 0.004, P value < 0.001). The most significant problem among males was disease of genitourinary system. There was significant positive correlation of multimorbidity with number of times of consultation in a year ($r = 0.442$, P value < 0.001). **Conclusion:** The study concludes that females are more likely to have chronic diseases at elder age than males. However, disease of the genitourinary system was significantly higher among male elderly. Multimorbidity significantly increased the need for frequent visits to the hospital.

Keywords: Co-morbidities, diabetes, hyperlipidemia, non-communicable, multimorbidity, old age

Introduction

Chronic diseases also known as Non-Communicable Disease (NCD) are the leading cause of death as well as disability worldwide. According to an estimate, 28 million patients die every year because of chronic illnesses such as cardiovascular

diseases (46.2%), cancers (21.7%), respiratory diseases (10.7%) and diabetes (4%), which are responsible for 82% of all deaths worldwide.^[1] These chronic illnesses have a negative impact on the life style of elderly people limiting their daily activity and cause many social, psychological and medical problems.^[2,3] Globally, the percentage of elderly aged 60 years and above is expected to increase from 600 million up to 2 billion by the year 2050.^[4] According to World Health Organization (WHO), in 2020, the burden of chronic illnesses will be 60%. The percentage of elderly population in Saudi Arabia was 4% in the year 2000,

Address for correspondence: Dr. Nazish Masud, College of Medicine-Male Branch, King Saud Bin Abdulaziz University for Health Sciences, P. O. Box 3660, Riyadh 11481, Saudi Arabia.

E-mail: masudn@ksau-hs.edu.sa; nazishmsd@yahoo.co.uk

Received: 25-11-2019

Revised: 23-01-2020

Accepted: 30-01-2020

Published: 26-03-2020

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_1060_19

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Alharbi BA, Masud N, Alajlan FA, Alkhanein NI, Alzahrani FT, Almajed ZM, *et al.* Association of elderly age and chronic illnesses: Role of gender as a risk factor. J Family Med Prim Care 2020;9:1684-90.

which has almost doubled currently and is expected to increase by many folds in the coming years.^[5] Most of the patients with chronic diseases are seen at the Primary Health Care (PHC) level. This increase in the elderly population is a big challenge for PHC setting in Saudi Arabia to provide their adequate needs of healthcare.^[6,7] Therefore, strengthening of the healthcare system in terms of availability and accessibility of physical, human and financial resources at PHC level is indispensable.^[8]

Prevalence of NCDs increases with advancing age especially among elderly females. For the past three decades NCD is a leading cause of premature death among women worldwide.^[9] Additionally, the health score of females is lower compared to men.^[10] In Saudi Arabia the prevalence of NCDs among elderly females is higher compared to males with hypercholesterolemia and chronic respiratory diseases almost twice prevalent among females compared to males.^[11] Multimorbidity is more common among elderly patients therefore patients are referred to a secondary or tertiary health care hospitals setting imposing additional economic implication for the health sector of a country.^[12] Unfortunately, many countries still focus on the uni-disease model of dealing with the non-communicable diseases. The new approaches focus on integrating the NCD at primary health care setting making countries more prepared to deal with the chronic diseases.^[13] There is little information about the prevalence of NCDs among Saudi elderly population assessing gender as a risk factor.^[14] The availability of updated and validated information is utmost for futures policy and planning. The aim of the study was to assess the differences among male and female elderly population seeking care for chronic illnesses at primary health care centers and identify the most common chronic comorbidities among elderly.

Methods

Study design and area and settings

A retrospective cross-sectional study was conducted, using the charts of the elderly patients who visited primary health care (PHC) centers at Khasm el Aan district in Riyadh, Saudi Arabia. The study was conducted from September 2017 to March 2019. These PHC centers are affiliated with King Abdulaziz Medical City in Riyadh which is one of the leading tertiary care hospital with approximately 1500 bed capacity. The electronic medical records of the patients were retrieved for the last one year period from the date of start of the study, using the BestCare® patient file management system already available in the hospital.

Identification of study participants

The definition of elderly was considered as 65 years and above for the study depending up the agreed definitions from other studies.^[15] A chronic illness was defined “if that person’s condition had lasted or was expected to last 12 or more months and resulted in functional limitations and/or the need for ongoing medical care”.^[16] For sample size the 95% confidence level and 5% margin of error was set using epi-info software the

optimal sample size was 319 elderly patients, which was divided equally among males and females. The patient’s records showed that almost 14000 charts met the inclusion criteria afterwards. Afterwards using a random sample generator in the Microsoft excel a random sample of 319 patients was generated from the population of 14000. The sample was equally divided by male and female gender in order to assess the risk of chronic illnesses among the two genders. The reason for selection of a random sample was to reduce the over or under estimation of the diseases prevalence and also and to reduce the risk of biases in our target population.

Data collection process

Data was collected by the research team members who were well versed with the hospital settings. The access to the data was provided by the Bed Management Department and Statistics Division at Department of Health Informatics in the hospital. After obtaining the list of all included patients, two co-investigators manually reviewed the files. The data was collected on an Excel sheet including the demographic variables and 19 chronic illnesses i.e. diabetes, dyslipidemia, cardiovascular diseases, stroke, arthritis, chronic respiratory disease, osteoporosis etc., were the main variables of interest.

Data analysis

Data was later transferred to Statistical Package for Social Sciences (SPSS) version 22 for analysis. The initial descriptive frequencies were run for all the variables in order to check for wrong entry and 10% of the data was checked with the original files for quality checking. Any discrepancies if found were identified and fixed before final analysis. The data set was grouped into male and female elderly and percentages and frequencies for the categorical variables, and the mean standard deviation of the numerical variables was reported. The number for chronic diseases per person were also computed and later categorized as patients having 1 disease, 2 diseases, 3 disease and more than 4 diseases. For assessing the differences by gender and the chronic illnesses, initial chi square test was applied. The distribution of diseases by different age categories was also reported after categorization of age into <70, 71-75, 76 -80 and >80 years age groups. The odds ratio was also reported for all the diseases to assess the gender as predictor for the chronic illnesses with females coded as 1 and male coded as 2. Logistic regression was also applied and the significance level was set at <0.05 for all statistical tests.

Ethical considerations

The study was conducted after approval from the ethical review committee of King Abdullah International Medical Research Center (KAIMRC) with memo no: (IRBC/1107/17). As no contact was done with the patients during the data collection, informed consent was not required. However, official approval was taken for accessing the medical record. All records were kept confidential and anonymous and only the research team members had access to the data.

Results

Profile of participants

The total number of elderly patients was 319 and the age ranged from 65 years to 104. Majority of elderly sample 107 (33.5%) were between 71-75 years old with a mean age of 75 ± 7 years. Almost equal gender distribution was observed, in which females were 152 (47.6%) versus 167 (52.4%) for males. Majority of study participants 260 (82.5%) were married. The females were more obese compared to men with 50 (33%) of women being severely obese (Obese class II-VI, BMI >35), while 60 (36%) of men were overweight with a mean BMI of 29 ± 6 . Almost half of patients, that is, 139 (43.6%), had 3-4 chronic illnesses at the minimum with a mean number of chronic illnesses per person 2.87 ± 1.7 . 37 (24.3%) women had at least 4 different chronic diseases while 42 (25.1%) men had 3 chronic illnesses. The average number of consultations per year was almost same for both males and females 6 ± 5 . The 5 most prevalent chronic illnesses among our elderly population were cardiovascular diseases 229 (71.8%), dyslipidemia 183 (57%), diabetes 179 (56%), genitourinary diseases 52 (16%) and arthritis 47 (14.7%) [Table 1].

Association of chronic illnesses with gender

The prevalence of chronic diseases showed that there was female predisposition for many of the NCD's with exception of only few diseases where male predisposition was noted, however for Diabetes almost equal prevalence was noted. Hyperlipidemia was significantly higher among elderly females with 96 (63%)

and ($\chi^2 = 3.9$, P value 0.046), followed by chronic respiratory diseases with male vs female percentage of 9 (5.4%) vs 23 (15%) and ($\chi^2 = 8.3$, P value = 0.004). Although there was no association between gender and arthritis, the male to female percentage was still higher with 21 (12.6%) vs 26 (17%), respectively. One of the important findings was that the percentage of eye diseases were almost double in females compared to men with 19 (12.5%) vs 11 (6.6%) and ($\chi^2 = 3.2$, $P = 0.07$). Also, similar finding was noted for endocrine diseases with male vs female 6 (3.6%) vs 24 (15.8%) ($\chi^2 = 13.8$, $P = <0.00$).

Males had significantly higher prevalence of Genitourinary diseases 44 (26%) with ($\chi^2 = 25.9$, P value <0.00). Additionally, stroke was also significantly higher among male vs female with 12 (7.2%) vs 3 (2%) ($\chi^2 = 4.8$, P value <0.00). None of the male patients in the study sample had osteoporosis and the total prevalence was 4% only. Musculoskeletal problems showed male predisposition with male vs female percentage of 9 (5.4%) vs 2 (1.3%), and ($\chi^2 = 3.9$, P value = 0.04). Overall prevalence of neoplasm, allergy and ear diseases in our population was <1% for each of the disease. The most significant problem among males with advancing age was disease of genitourinary system and it was common among elderly with more than 70 years of age. While arthritis was seen mostly between the ages of 71-80 with P value = 0.015 [Tables 2 and 3].

The results for logistic regression showed significant results for dyslipidemia for females with OR = 1.5, 95% CI of (1-2.4) and

Table 1: Profile of participants

Variables	Categories	Total n=319		Male n=167		Female n=152	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Age in years	Mean±SD	75±7		75±7		76±7	
Age categories	<70	84	26.3%	49	29%	35	23%
	71-75	107	33.5%	49	29%	58	38%
	76-80	63	19.7%	36	22%	27	18%
	> 80	65	20.4%	33	20%	32	21%
BMI	Mean±SD	30±6.7		29±6		31±7	
BMI categories	under weight	4	1.3%	4	2%	0	0%
	Normal	59	18.5%	34	20%	25	16%
	overweight	100	31.3%	60	36%	40	26%
	Obese class I (moderately obese)	73	22.9%	36	22%	37	24%
	Obese class II-VI (BMI >35)	83	26.0%	33	20%	50	33%
Marital status	Single	2	0.6%	2	1%	0	0%
	Married	260	82.5%	163	99%	97	65%
	Divorced	4	1.3%	0	0%	4	3%
	Widowed	49	15.6%	0	0%	49	33%
Referral for further consultation	No	234	73.4%	122	73%	112	74%
	Yes	85	26.6%	45	27%	40	26%
Number of chronic illnesses per person	Mean±SD	2.87±1.7		2.7±1.63		3±1.74	
Number of chronic illnesses among patients	With 1 disease	71	22.3%	40	24.0%	31	20.4%
	With 2 diseases	61	19%	33	19.8%	28	18.4%
	with 3 diseases	71	22.3%	42	25.1%	29	19.1%
	With 4 diseases	68	21.3%	31	18.6%	37	24.3%
	>4 diseases	48	15%	21	12.6%	27	17.8%
Number of consultations per (year)	Mean±SD	6±5		6±4		6±5	

Table 2: Distribution of diseases by Gender

Variables	Total n=319		Male n=167		Female n=152		P
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Diabetes	179	56.1%	94	56.3%	85	55.9%	0.947
Dyslipidaemia	183	57.4%	87	52.1%	96	63.2%	0.046*
Cardiovascular diseases	229	71.8%	117	70.1%	112	73.7%	0.473
Stroke	15	4.7%	12	7.2%	3	2.0%	0.028*
Arthritis	47	14.7%	21	12.6%	26	17.1%	0.254
Chronic respiratory disease	32	10.0%	9	5.4%	23	15.1%	0.004*
Cancer	11	3.4%	5	3.0%	6	3.9%	0.64
Psychiatric disorder	10	3.1%	4	2.4%	6	3.9%	0.52
Osteoporosis	13	4.1%	0	0.0%	13	8.6%	<.001*
Endocrine disorders	30	9.4%	6	3.6%	24	15.8%	<.001*
GIT disease	16	5.0%	9	5.4%	7	4.6%	0.74
Diseases of the eye and adnexa	30	9.4%	11	6.6%	19	12.5%	0.07
Diseases of the nervous system	16	5.0%	8	4.8%	8	5.3%	0.84
Diseases of the blood	10	3.1%	3	1.8%	7	4.6%	0.20
Liver disease	9	2.8%	4	2.4%	5	3.3%	0.74
Sleep disorder	6	1.9%	3	1.8%	3	2.0%	1.00
Diseases of the musculoskeletal system and connective tissue	11	3.4%	9	5.4%	2	1.3%	0.04*
Diseases of the genitourinary system	52	16.3%	44	26.3%	8	5.3%	<.001*
Diseases of the skin and subcutaneous tissue	8	2.5%	6	3.6%	2	1.3%	0.287

*Chi square/Fishers Exact statistic significant at <0.05, The values <0.05 are presented as bold

Table 3: Distribution of chronic illnesses by age categories (n=319)

List of chronic diseases	Age categories								P
	<70		71-75		76-80		>80		
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Diabetes	46	54.8%	68	63.6%	36	57.1%	29	44.6%	0.112
Dyslipidaemia	39	46.4%	69	64.5%	36	57.1%	39	60.0%	0.89
Cardiovascular diseases	58	69.0%	80	74.8%	45	71.4%	46	70.8%	0.845
Stroke	2	2.4%	4	3.7%	5	7.9%	4	6.2%	0.363
Arthritis	4	4.8%	21	19.6%	13	20.6%	9	13.8%	0.015*
Chronic respiratory disease	7	8.3%	11	10.3%	7	11.1%	7	10.8%	0.941
Cancer	3	3.6%	2	1.9%	3	4.8%	3	4.6%	0.669
Psychiatric disorder	1	1.2%	4	3.7%	3	4.8%	2	3.1%	0.588
Osteoporosis	1	1.2%	3	2.8%	6	9.5%	3	4.6%	0.083
Endocrine disorders	8	9.5%	5	4.7%	8	12.7%	9	13.8%	0.163
GIT disease	2	2.4%	8	7.5%	4	6.3%	2	3.1%	0.365
Diseases of the eye and adnexa	5	6.0%	9	8.4%	6	9.5%	10	15.4%	0.258
Diseases of the nervous system	3	3.6%	4	3.7%	5	7.9%	4	6.2%	0.558
Diseases of the blood	2	2.4%	4	3.7%	4	6.3%	0	0.0%	0.202
Liver disease	2	2.4%	5	4.7%	1	1.6%	1	1.5%	0.680
Sleep disorder	0	0.0%	1	0.9%	3	4.8%	2	3.1%	0.095
Diseases of the musculoskeletal system and connective tissue	3	3.6%	1	0.9%	1	1.6%	6	9.2%	0.033*
Diseases of the genitourinary system	5	6.0%	21	19.6%	13	20.6%	13	20.0%	0.030*
Diseases of the skin and subcutaneous tissue	2	2.4%	2	1.9%	3	4.8%	1	1.5%	0.678

*Chi square/Fishers Exact statistic is significant at the 0.05 level, The values <0.05 are presented as bold

$P = 0.04$. Stroke was less likely to occur among females with OR and 95% CI of 0.26 (0.07-0.94) and $P = 0.04$. Additionally, the genitourinary disease was also significantly more among males. For all the other diseases excluding the chronic respiratory and endocrine diseases, none of them had significant association as per result of logistic regression. However, the odds ratio for majority of the diseases was more than 1 making females

at higher risk of acquiring the disease compared to males. There was also significant positive correlation among the number of chronic diseases in a patient with number of times of consultation in a year ($r = 0.442$, P value <0.000). Thus those patients who had more than one chronic illness they had more frequent visits in the hospital. Additionally these was positive correlation between the age of the patients and

the total number of chronic diseases in a patient ($r = 1.27$, P value = 0.023) [Table 4 and Figure 1].

Discussion

The present study aimed at accessing the prevalence of chronic NCD among elderly population in Riyadh. The results showed that male had significantly higher prevalence of stroke, genitourinary diseases and MSK diseases. Whereas the elderly females had significantly higher prevalence of hyperlipidemia, endocrine diseases, osteoporosis and chronic respiratory diseases. Cardiovascular (CVS) diseases were the most common cause of morbidity in our study accounting for 71% (males 70.1% and females 73.7%). The result were very similar to the prevalence of cardiovascular diseases in United States (US) where 71% of

elderly populations aged between 60 and 80 are effected.^[17] Also similar finding was reported by study done among elderly in Buraidah reported the prevalence for hypertensive at 71.3%.^[18] These findings highlights the fact that the lifestyle changes are almost global now sedentary lifestyle is much more common, which is why it is one of the leading cause of death in elderly population globally.^[19] Moreover, CVDs are a significant public health issue worldwide.^[20]

Although the percentage of CVS diseases was almost similar for both male and females but dyslipidemia was significantly higher among females, which is another important finding of the study. A study conducted in Asaba-Nigeria found the prevalence of dyslipidemia in the overall population was 69.9% for both genders.^[21] In China, the prevalence of dyslipidemia was also higher for elderly women 65 years and above compared to men, but in comparison to our study population it is still lower with 42%.^[22] This higher prevalence in our participants specially females could be accounted for the differences in cultures and eating habits and most importantly obesity which was more prevalent among our females participants.^[4,6] This higher percentage can also be explained by the changes in hormones that alter the metabolism of lipoprotein throughout their lives and elderly in specific as they experience the menopausal transition that worsens their lipid profile. Numerous reports confirm that positive effect of healthier diet results in lowering of dyslipidemia and CVDs even in obese patients.^[23] Hence, it is important for life style modifications including dietary intervention that should be the first step in the management of patients with dyslipidemia.^[24]

The third most common cause of morbidity was diabetes accounting for 56.1%, which is very high compared to 25% of American population aged 65 or older.^[25] A similar finding was reported by study conducted in southern Saudi Arabia.^[26] As a consequence of aging, the function of beta cells start to decline independently to insulin resistance and the risk of development of diabetes mellitus Type 2 increases with obesity and lack of physical activity and insulin resistance increases further with aging.^[27] The presence of obesity in more than half of our elderly sample could be one of the explanation for higher prevalence of diabetes especially among females. Simultaneously, the advancement of technology such as cars, elevators and remote controlled devices had led to increases sedentary life style which is a major risk factor for acquiring non communicable diseases.^[28] According to cultural norms of the society, most of the Saudi women depend on the male members of the family for mobility, thus increasing further the risk of inactivity amongst elderly as they still continue with the old norms. Females are more likely to have the elder self-neglect issue.^[7]

The diseases of the genitourinary system in our study were exactly same as another study conducted in Saudi Arabia which reported the prevalence among elderly as 19.8%.^[29,30] In the US, Benign Prostatic Hypertrophy (BPH) affects 80% of those aged 70 years and older.^[31] Whereas in Korea, the prevalence of BPH is 43% among elderly aged 70s, and increases further by

Table 4: Gender as the predictor for the chronic illnesses (n=319)

List of chronic diseases	OR* (95% CI)	P
Diabetes	0.99 (0.77-1.2)	0.94
Dyslipidaemia	1.5 (1-2.4)	0.04
Cardiovascular diseases	1.1 (0.73-1.9)	0.47
Stroke	0.26 (0.07-0.94)	0.04
Arthritis	1.4 (0.7-2.6)	0.25
Chronic respiratory disease	3.1 (1.3-7)	<0.00
Cancer	1.3 (0.39-4.4)	0.64
Psychiatric disorder	1.6 (0.4-6)	0.43
Endocrine disorders	5 (1.9-12.6)	<0.00
GIT disease	0.84 (0.3-2.3)	0.74
Diseases of the eye and adnexa	2.0 (0.9-4.4)	0.07
Diseases of the nervous system	1.1 (0.4-3.0)	0.84
Diseases of the blood	2.6 (0.67-10)	0.16
Liver disease	1.3 (0.36-5.2)	0.63
Sleep disorder	1.1 (0.21-5.5)	0.90
Diseases of the musculoskeletal system and connective tissue	0.23 (0.05-1.1)	0.06
Diseases of the genitourinary system	0.15 (0.07-0.34)	<0.00
Diseases of the skin and subcutaneous tissue	0.358 (0.07-1.8)	0.21

*OR=Odds Ratio, Logistic regression applied P value set at 0.05

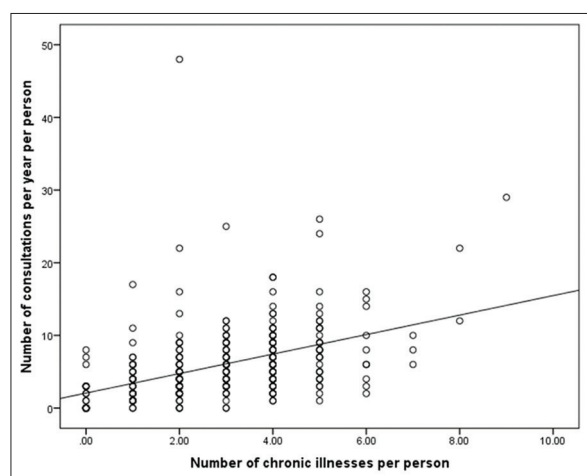


Figure 1: Correlation of number of chronic illness with number of consultations in a year

10% at age of 80 years.^[32] The varying results may be related to differences among the cultural composition, and socioeconomic makeup. While age is an important risk factor for development of this condition, other modifiable risk factor such as obesity, diabetes and hypertension contribute as well.

The study provides an insight into the burden of chronic illnesses at one point in time. The random sampling technique increases the validity of the results for the larger populations. Although the causal relationship couldn't be established but that was out of the scope of this study considering that fact that 19 different chronic diseases were included and controlling for confounders and all the risk factors for each one of them was relatively impossible. Also, one of the limitations was the non-availability of the data on sociodemographic profile of the participant including monthly income, educational level, employment status and source of income, which restricted us to make other inferences based on these predictors. One of the obstacles faced during the study was that different doctors labeled the same disease in a different way like hyperlipidemia and dyslipidemia, asthma and respiratory disease, arthritis and joint pain, these different names required detailed information about the patient's previous visits and investigations in order to get a confirm diagnosis. This process consumed a lot of time and effort. Although effort was made to get on confirmed diagnosis, this could still have led to over or underreporting of some of the prevalence in our sample. Also, in order to make the necessary policy and strategic planning for catering the burden of the non-communicable diseases, it is recommended to make decisions ahead of time in order to avoid delays in the implementation phase.^[8,13] Many countries still focus on the uni-disease model of dealing with the non-communicable diseases. The time of need is to prepare the primary healthcare setting^[33] for dealing with gender focused multimorbidity as research is showing female predominance for many chronic illnesses. The future cohort studies on the likelihood of gender as risk factor for chronic diseases should be done to explore the phenomenon further in different populations.

Conclusion

The elderly females are more likely to have chronic diseases compared to men who are at higher risk of getting stroke, musculoskeletal and genitourinary diseases. Our study showed that common chronic illnesses among elderly were cardiovascular diseases, dyslipidemia, diabetes, diseases of the genitourinary system, and arthritis. Most of elderly had more than three chronic diseases. In the coming years the elderly population is expected to rise thus actions well in advance are required in order to meet the increased demand for healthcare provision for non-communicable diseases. The timely readiness of the PHC and the first line services are integral in order to deal with this situation.^[8,13]

Data availability

Data used to support the findings of this study are available from the corresponding author upon request.

Acknowledgements

We extend thanks to the medical record department to provide us with the necessary data to conduct this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There is no conflicts of interest.

References

- Riley L, Cowan M. World Health Organization noncommunicable diseases country profiles. Geneva, Switzerland: WHO Library Cataloguing-in-Publication Data. 2014. Available at: <https://www.who.int/nmh/publications/ncd-profiles-2014/en/>. [Last accessed on 2019 Mar 21].
- Pratley RE, Gilbert M. Clinical management of elderly patients with type 2 diabetes mellitus. *Postgrad Med* 2012;124:133-43.
- Kirkman MS, Briscoe VJ, Clark N, Florez H, Haas LB, Halter JB, *et al.* Diabetes in older adults. *Diabetes Care* 2012;35:2650-64.
- World Health Organization. World Report on Ageing and Health. World Health Organization; 2015. p. 260.
- Al-Shehri SA. Oral health status of older people in residential homes in Saudi Arabia. *Open J Stomatol* 2012;2:307-13.
- Hafez G, Bagchi K, Mahaini R. Caring for the elderly: A report on the status of care for the elderly in the eastern Mediterranean region. *East Mediterr Health J* 2000;6:636-43.
- Forrest CB, Nutting P, Werner JJ, Starfield B, Von Schrader S, Rohde C. Managed health plan effects on the specialty referral process results from the ambulatory sentinel practice network referral study. *Med Care* 2003;41:242-53.
- Parameswaran K, Agrawal T. Readiness of primary health centers and community health centers for providing noncommunicable diseases-related services in Bengaluru, South India. *Int J Noncommunicable Dis* 2019;4:73.
- McIntyre D. WHO global coordination mechanism on the prevention and control of non-communicable diseases. Working Group on how to realize governments' commitment to provide financing for NCDs (Geneva, 23-24 February 2015). Policy brief. Domestic financing for NCDs. Geneva: World Health Organization; 2015.
- World Health Organization. The world health report 2002: Reducing risks, promoting healthy life. World Health Organization; 2002.
- Elderly Survey [Internet]. Stats.gov.sa. 2017. Available from: https://www.stats.gov.sa/sites/default/files/elderly_survey_2017en.pdf. [Last cited on 2019 Sep 10].
- Scully P, O'Donnell B, Peters C, O'Connor M, Lyons D. Older patient hospital admissions following primary care referral: The truth is in the referring. *Ir J Med Sci* 2016;185:483-91.
- Tapela NM, Tshisimogo G, Shatera BP, Letsatsi V, Gaborone M, Madidimalo T, *et al.* Integrating non-communicable disease services into primary health care, Botswana. *Bull WHO* 2019;97:142-53.
- Allain TJ, Wilson AO, Gomo ZA, Mushangi E, Senzanje B, Adamchak DJ, *et al.* Morbidity and disability in elderly

- Zimbabweans. *Age Ageing* 1997;26:115-21.
15. Kowal P, Dowd JE. Definition of an older person. Proposed working definition of an older person in Africa for the MDS Project. Geneva: World Health Organization. doi: 2001;10 (2.1):5188-9286.
 16. Hwang W, Weller W, Ireys H, Anderson G. Out-of-pocket medical spending for care of chronic conditions. *Health Aff* 2001;20:267-78.
 17. Go AS, on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics-2013 update: A report from the American Heart Association. *Circulation* 2013;127:e6-245.
 18. Saquib N, Saquib J, Alhadlag A, Albakour MA, Aljumah B, Sughayyir M, *et al.* Chronic disease prevalence among elderly Saudi men. *Int J Health Sci* 2017;11:11-6.
 19. Roger VL, Go AS, Lloyd-Jones DM, Adams RJ, Berry JD, Brown TM, Carnethon MR, Dai S, De Simone G, Ford ES, Fox CS. Heart disease and stroke statistics—2011 update: A report from the American Heart Association. *Circulation* 2011;123:e18-209.
 20. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ. Global and regional burden of disease and risk factors, 2001: Systematic analysis of population health data. *Lancet* 2006;367:1747-57.
 21. Odenigbo CU, Odenigbo UM, Oguejiofor OC, Okonkwo UC ON. Prevalence of dyslipidaemia in elderly subjects in Asaba, South South Nigeria. *J Indian Acad Geriatr* 2010;6:160-4.
 22. Moran A, Gu D, Zhao D, Coxson P, Wang YC, Chen CS, *et al.* Future cardiovascular disease in China: Markov model and risk factor scenario projections from the coronary heart disease policy model-China. *Circulation: Cardiovasc Qual Outcomes* 2010;3:243-52.
 23. Liu Y, Zhang P, Wang W, Wang H, Zhang L, Wu W, *et al.* The characteristics of dyslipidemia patients with different durations in Beijing: A cross-sectional study. *Lipids Health Dis* 2010;9:115.
 24. Gill DL, Hammond CC, Reifsteck EJ, Jehu CM, Williams RA, Adams MM, *et al.* Physical activity and quality of life. *J Prev Med Public Health* 2013;46(Suppl 1):S28-34.
 25. Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2017. Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services; 2017.
 26. Al-Modeer M, Hassanien NS, Jabloun CM. Profile of morbidity among elderly at home health care service in Southern Saudi Arabia. *J Fam Community Med* 2013;20:53-7.
 27. Edelstein SL, Knowler WC, Bain RP, Andres R, Barrett-Connor EL, Dowse GK, *et al.* Predictors of progression from impaired glucose tolerance to NIDDM: An analysis of six prospective studies. *Diabetes* 1997;46:701-10.
 28. Cho N, Shaw JE, Karuranga S, Huang Y, da Rocha Fernandes JD, Ohlrogge AW, *et al.* IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. *Diabetes Res Clin Prac* 2018;138:271-81.
 29. Alanazi AB, Alshalan AM, Alanazi OA, Alanazi MS, Alanazi AI, Alanazi AH, *et al.* Epidemiology of senile prostatic enlargement among elderly men in Arar, Kingdom of Saudi Arabia. *Electron Physician* 2017;9:5349-53.
 30. Almarkhan MH, Sawma AI, Alruwaili FS, Alsaqabi QA, Alonazi MA, Alruwaili WS, *et al.* Prevalence of benign prostatic hyperplasia (BPH) in Saudi patients above 40 years old. *Egypt J Hosp Med* 2018;70:1137-39.
 31. Wei JT, Calhoun E, Jacobsen SJ. Urologic diseases in America project: Benign prostatic hyperplasia. *J Urol* 2005;173:1256-61.
 32. Park HK, Park H, Cho SY, Bae J, Jeong SJ, Hong SK, *et al.* The prevalence of benign prostatic hyperplasia in elderly men in Korea: A community-based study. *Korean J Urol* 2009;50:843-7.
 33. Rawal LB, Kanda K, Biswas T, Tanim MI, Poudel P, Renzaho AM, *et al.* Non-communicable disease (NCD) corners in public sector health facilities in Bangladesh: A qualitative study assessing challenges and opportunities for improving NCD services at the primary healthcare level. *BMJ Open* 2019;9:e029562.