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Original Article

Non-Communicable Disease Mortality among a Sample of Older People in Iran from 2007 to 2018

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Introduction: Increasing age is one of the most important predictors of mortality among aged population. Therefore, determining the causes of death among older people could be imperative. The purpose of this study was to investigate non-communicable disease mortality among a sample of older people in Iran from 2007 to 2018.

Methods: This was a retrospective descriptive study that applied census sampling technique to investigate 1202 Medical Records of older adults (60 ≤ years old) died during 2007-2018 at three hospitals of Khuzestan province, Iran. Data analysis was conducted using SPSS version 24 software.

Results: The mean age of participants was 77.4 ± 8.38. Of whom 50.7 % were male. The highest number of deaths were related to the internal ward (41.4%), CCU (29.3%) and ICU (25.6%), respectively. In addition, Angina pectoris, Respiratory disease and Cerebrovascular Accident were the most important cause of death among aged population. Also, the history of hospitalization (87.1%) and cardiovascular disease (82.2%), and hypertension (67.8%) were the prominent risk factors for mortality among aged population. According to chi-squared, there was a significant relationship between smoking and death attributed to cardiovascular diseases among older adults.

Conclusion: Angina pectoris, Respiratory disease and Cerebrovascular accident diseases are the most important cause of death among older adults. Prevention and screening programs should be implemented to discern and screen these chronic diseases at the early stage among older people.

Keywords: Non-Communicable Disease, Mortality, Aged

Introduction

Epidemiological transition in developing countries result in changing the cause of death from infectious to some non-communicable diseases (NCDs), including heart disease, cancer, diabetes, and respiratory disease (1, 2). This shift can be attributed to some achievements in health improvements, such as high rate of vaccination coverage, improved sanitation, access to medical care, and attainment of higher life standards. Furthermore, since the rate of fertility and mortality have been decreasing, the proportion of older people is increasing (3), which can be result in increasing prevalence of chronic

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NCDs for aging population because the health condition of people would be deteriorated as they get older (4).

In the definition of chronic NCDs, it can be said that any non-communicable condition that is persistent for one year or more and need constant medical care services and/or bring about a huge limitation in activities of daily living (5). In 2016, NCDs were responsible for 73% leading cause of death across the world, and the disability adjusted life year (DALYs) due to NCDs was 59.7 (61.7-7.7%) (6). The percentage of deaths associated with NCDs in low and middle income countries was approximately 80%, which have indicated that mortality distribution is not equally worldwide (6). Also, In Iran, 287000 individuals were killed because of NCDs in 2016 (7). Furthermore, 6.5 million years of life loss (YLLs) and 8.5 million years of DALYs were related to NCDs (7). In Iran, the burden of NCDs among aged population (70+ years old) was account for 90-92% from 1990-2015, which was higher than EMRO region and world estimations (8). According a study in China, the cardiovascular disease will more likely to increase account for 50% between 2010 and 2030 due to aged population growth (9). Recent work by Cheng et al. has examined that deaths attributed to population aging were related to ischemic heart disease and stroke (10). It should be noted that high prevalence of NCDs among aged population may be associated with the existence of known risk factors among this group (11).

Although aging can have the predominant role in increasing prevalence of NCDs, the number of risk factors consist unhealthy life style such as tobacco use, excessive use of alcohol, unhealthy diet, and physical inactivity and increased blood pressure (12, 13). The interaction of known risk factors could result in occurrence of NCDs including cancer and cardiovascular disease (14). According to an Iranian national survey in 2014, 7.9% of older adults smoked cigarette, the prevalence of diabetes was 20.5% for men and 23.5% for women, the prevalence of hypertension was reported 47.6% and 52% for men and women, respectively. In terms of nutrition status, 5.5% of older adults were affected by malnutrition and 41.3 % were at the risk of malnutrition and the prevalence of obesity was reported 89.2% and 65.9% for men and women, respectively. Also, 22.5% of older adults did not take part in physical activity (15, 16). Although several previous community-based studies about mortality rate among all age groups (17, 18), were conducted in Iran, none of them have particularly focused on older adult's mortality. Then, development of a national mortality and its related risk factor profile for NCDs among aged population not only could provide predominant information for planning prevention and control activity but also it could predict the burden of disease in future. Therefore, the present study aimed at investigating the trend of NCDS mortality among a sample of older people in Iran from 2007 to 2018.

Methods

Research design

This study was a retrospective descriptive. The raw data was obtained from three Hospitals in Khuzestan Province (Shahid Mostafa Khomeini, 17 Shahrivar, and Amiralmomenin) since 2007-2018. This province is located in southwest of Iran and its area is 63,238 km in a subtropical zone (19), and according to last census in 2016, the population of older adults aged 60 and over was 257290 (20). For this survey, 1202 Medical Records (MR) of older adults (60 ≤ years old) who died during 2007-2018 through census sampling technique were retrospectively reviewed.

Instrumentation

A researcher-made checklist was used to extract required information from MR, which were including, demographic information, characteristics in relation to death occurrence among older adults in three hospitals (cause of death, time of death, issuance of death certificate, period of hospitalization, death occurrence in hospital wards), and risk factors related to NCDs among older adults (smoking, substance abuse, history of hypertension, diabetes, hyperlipidemia, cardiovascular disease, Pulmonary disease, and history of hospitalization).

Ethical considerations

Ethical approval was obtained from university of social welfare and rehabilitation sciences, Tehran, Iran (IR.USWR.REC.1398.105). Since the current study was retrospective design, the researcher was cautious to maintain the principals of confidentially and anonymity.

Data analysis

Descriptive data were generated in the format of percentages for categorical variables, and mean with standard deviation for all variables. Chie-squared was conducted to determine significant relationship among cigarette smoking and all-cause mortality attributed to cardiovascular disease. Data management and analysis were performed using IBM SPSS (2010).

Results

In the present study, 1202 medical records (men = 603, women = 586) were assessed, the mean age of older adults was 77.42 ± 8.38. In total, 547 of older adults were at the age of 75-84 (old-old). From aspect of marital status, the majority of older people were married (99.1 %, n = 1185). Fifty percent of older adults were retired. Nearly, three in fourth of older adults (70.6%) had no formal education. The majority of our aged population resided at own house (81.5%, n = 887), nine hundred fifty five older people lived in urban region. Fifty percent of the participants had 5-8

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children. Table 1 indicates socio-demographic characteristics of subjects in three hospitals.

In total, a large percentage of deaths were due to Angina pectoris (22.2%, n = 261), Respiratory disease (20.1%, n = 236), Cerebrovascular accident (CVA) (16.3%, n = 192), and Cardiovascular disease (15%, n = 176), respectively. Nearly half of deaths (42.3%, n = 484) were occurred at night. More than half of death certificates (76.8%) were issued at the hospital. In term of period of hospitalization, the longer length of stay in hospital was 3-7 days; the median length of hospital stay was 6.85 ± 7.99. The percent of mortality at three hospital wards, including internal medicine, coronary care unit (CCU), and intensive care unit (ICU) was high, which were 41.4%, 29.3%, and %25.6 respectively. Table 2 shows characteristics in relation to death occurrence among older adults in three hospitals. Figure 1 shows the cause of death due to non-communicable diseases in aged population.

Approximately one-fourth of older adults (26.7%, n = 315) smoked. The rate of substance abuse was 3.4% older adults. In total, history of some NCDs, including hypertension, diabetes, hyperlipidemia, cardiovascular disease, and pulmonary disease were 67.8%, 59.5%, 26.3%, 82.2%, and 44.9%, respectively. Eighty-seven percent of older adults with NCDs had history of hospitalization. Table 3 highlights risk factors related to Non-communicable disease among older adults.

Discussion

This retrospective descriptive study was about mortality among a sample of older people in Iran from 2007 to 2018. The mean age of study population was 77.42 ± 8.38, and the majority of deaths occurred in age group of 60-84, which is reflected the prior survey that in late-middle and early-old age pattern of mortality increase (21). A possible explanation for this might be that in early-age the rate of physiological deterioration will be increased because the rate of damage repair declines (21). On the other hand, the mortality rate tend to decreased among oldest ages, this discrepancy may be due to the predominant role of genetic, environmental, and behavioral characteristics among this age group (22). Furthermore, there is less evidence of mortality due to chronic conditions among oldest-old. In fact, functional limitations are the predominant predictor of mortality at advanced age (23).

Table 1. Socio-demographic characteristics of subjects in three hospitals

Variable		N	%
Age	Young old	424	35.4
	Old-old	547	45
	Oldest-old	234	19.6
Sex	Male	603	50.7
	Female	586	49.3
Marital status	Never married	2	0.4
	Married	1185	99.1
	Widow/widower	9	0.5
Job	employed	112	9.9
	Self-employment	202	17.8
	Housekeeper	252	22.2
	Retired	568	50.1
Education	No formal education	699	70.6
	Under diploma	268	27.1
	Diploma	23	2.37
Living arrangement	Own house	887	81.5
	With children	195	17.9
	Nursing home	7	0.6
The place of living	Urban	955	80.3
	Rural	235	19.7
The number of children	4 ≥	100	26.4
	5-8	190	50.1
	9 ≤	89	23.5

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Table 2. Characteristics in relation to death occurrence among older adults in three hospitals

Variable		N	%
Cause of death	Angina pectoris	261	22.2
	Respiratory disease	236	20.1
	Cerebrovascular accident	192	16.3
	Cardiovascular disease	176	15
	Septicemia	119	10
	Cancer	89	7.63
	Chronic Kidney Disease	35	3
	Heart Valve Problem	20	1.7
	Hepatic	12	1
	Gastrointestinal Bleeding	12	1
	Diabetes	10	0.9
	Digestive problems	8	0.7
	Accident	3	0.2
	Alzheimer	1	0.09
	Seizure	1	0.09
	Hypovolemic Shock	1	0.09
Time of death	Morning	384	33.6
	Afternoon	275	24.1
	Night	484	42.3
Issuance of death certificate	Forensic Medicine Center	266	23.2
	Hospital	882	76.8
Period of hospitalization	2 ≥	247	34.2
	3-7	269	37.3
	8 ≤	206	28.5
Hospital's ward	Infection	3	0.3
	emergency	4	0.3
	Surgery	37	3.1
	Internal medicine	494	41.4
	CCU	349	29.3
	ICU	306	25.6

Table 3. Risk factors related to non-communicable disease among older adults

Variable		N	%
Smoking	Yes	315	26.7
	No	866	73.3
Substance abuse	Yes	36	3.4
	No	1140	96.6
History of hypertension	Yes	813	67.8
	No	386	32.2
History of diabetes	Yes	713	59.5
	No	486	40.5
History of hyperlipidemia	Yes	315	26.3
	No	884	73.3
History of cardiovascular disease	Yes	986	82.2
	No	213	17.8
History of pulmonary disease	Yes	538	44.9
	No	661	55.1
History of other non-communicable disease	Yes	228	19
	No	971	81
History of hospitalization	Yes	1004	87.1
	No	149	12.9

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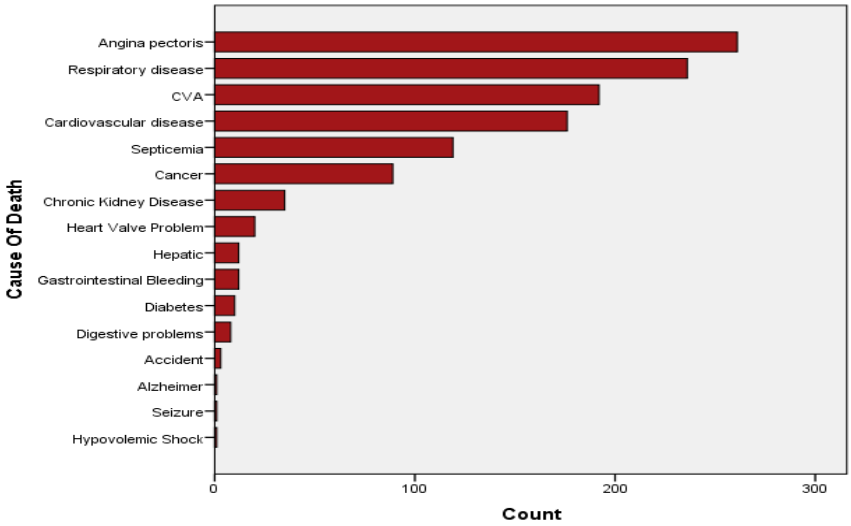


Figure 1. Cause of death due to non-communicable diseases in aged population

Overall, the majority of death caused by NCDs across the world, which is about more than 73% of global death (24). Based on Global Burden of Disease report in 2017, cardiovascular disease, cancers, respiratory disease are third leading of death among 50-69 and over year-old (24). In contrast, in the current study, Angina pectoris, Respiratory disease, and CVA were the predominate cause of death among aged population. This result may be explained by the fact that racial differences and its attributed risk factors including socioeconomic status, health behavior, health insurance, and health status could have an important role in all-cause of death among older people around the world (25). In the present study, the majority of deaths occurred at night and morning. According to current evidence, 60 percent of deaths occurred between 2 A.M and 8 A.M, it is therefore likely that such connections exist between the time interval between the time of death and find the body the next day, providing uneven health care services between 2 A.M and 8 A.M ,and the influences of circadian rhythms, sleep, and disease processes that may increase the probability of death (26). In our study, the median length of hospital stay was 8 days (range, 0-60), which was consistent with Oruç et al. survey (27, 28).

The mortality rate among CCU, and ICU wards were high in comparison with other wards of hospital. Within our sample, 41.4% of older patients admitted in internal medicine ward died, we found that much higher values with respect those reported by Simon et al. (29). The mortality rate in ICU was 25.6%, which was lower than 42% total mortality rate indicated in the study conducted by Daubin et al. (30). Nearly 30% of death occurred in coronary care unit that was relatively high as compared to 13% mortality among patient in Canada (31), 7-8% mortality in United States (32). This difference can be explained in part by the proximity of high rate of mortality due to Angina pectoris and hospitalization in CCU in the current study. One unanticipated finding was that despite cognitive impairment has already been determined as a predictor of mortality among older patients (33), the cause-specific share of deaths caused by it was very low in our study.

In addition to NCD smortality, different risk factors for mortality among our sample population were reported, history of hospitalization was a crucial risk factor among older adults, which was consistent with Obiora's study (34). In accordance with previous study, the frailty of hospitalized older individuals could lead to higher mortality rate among this group because these patients have chronic comorbidity and functional disability (35). Furthermore, the History of cardiovascular disease, hypertension, and diabetes could have pivotal risk factors for mortality among older population. High blood pressure is considered as main risk factor for cardiovascular morbidity and mortality among older population (36), which is in accordance with the result of prior study (37). Hypertension may have relatively impact on mortality among patients with two various chronic diseases (37). In this study, there was a significant relationship among cigarette smoking and all-cause mortality related to cardiovascular disease among our population, which was consistent with other studies in this filed (38-40).

Conclusion

Angina pectoris, Respiratory disease, and CVA diseases were the most important cause of death among older adults. Prevention and screening programs should be implemented to detect and screen these chronic diseases at the early stage among older people.

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Study limitations

It is plausible that a number of limitations may have influenced the results obtained. The first is a retrospective design and the fact that all cases were recruited from one single province and related laboratory variables were not taken into account. The second is a real trend of disease- related death and its risk factors were not particularly determined for each year. Therefore, it is recommended that future research should be undertaken in the following areas: 1) the further studies should be validated by a larger sample size among all provinces across the country so that provide vital information to compare the all-cause of death among older adults based on diverse cultural and ethnicity background. 2) The future prospective cohort studies are needed to estimate social and health determinants related to all- cause of death in older people.

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Conflict of interest

All authors have not declared conflict of interest in this project.

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Authors' contributions

All authors have participated in the design and implementation of the study. All authors have participated to draft or modify the manuscript, read and approved the final version of the article.

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