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Research Paper

Investigating Some Risk Factors Related to the COVID-19 Pandemic in the Middle-aged and Elderly

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Aging, COVID-19, Risk factor, Diabetes, Body Mass Index (BMI)

ABSTRACT

Objectives The outbreak of Coronavirus Disease 2019 (COVID-19) has influenced all age groups; however, the risk of mortality increases with age. Several factors impact the development of this disease. This study aimed to determine the relationship between some risk factors in the development of COVID-19 among community dwellers of ≥50 years of age.This cross-sectional study was performed at Shahroud University of Medical Sciences from April 1, 2019, to June 20, 2020.

Methods & Materials This cross-sectional study was conducted on individuals aged ≥50 years, including middle-aged and aging suspected of COVID-19 referring to registration centers in Shahroud University of Medical Sciences from Feb. 20th to Jun. 20th, 2020. The basis for diagnosing COVID-19 in suspected cases was a positive Reverse Transcription Polymerase Chain Reaction (RT-PCR) test based on a nasopharyngeal swab or Computed Tomography (CT) scan. The data used included demographic information, a history of smoking, and comorbidities. Data analysis was performed in SPSS by descriptive statistics, Chi-squared test, Independent Samples t-test, and logistic regression model.

Results In the first 4 months of the COVID-19 outbreak, 3945 suspicious cases were referred to Shahroud healthcare centers. After removing the missing cases, of the 3119 registered cases, 1348 participants were aged ≥50 years. Of all eligible participants, 602 cases were diagnosed with COVID-19, and 303 were males. The obtained data suggested that the Mean±SD age of the study subjects was 66.62±11.33 years. Diabetes (P=0.014) and other comorbidities, such as asthma, acute respiratory, hepatic and kidney diseases, and cancer in borderline significantly increased the incidence of COVID-19 by 38% and 32%, respectively. An increase of one unit in Body Mass Index (BMI) (P=0.002) enhanced the odds of infection by 4%.

Conclusion Based on the multivariate logistic regression results, high BMI and diabetes were significant risk factors in the development of COVID-19 among aged subjects. This conclusion emphasizes the importance of BMI and diabetes in the assessment of patients in middle-aged and aging groups.

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Extended Abstract

1. Introduction

The Coronavirus Disease 2019 (COVID-19) pandemic is a global emergency [1]. Although the disease has been observed in all age groups, the virus is more threatening in the elderly, and the risk of death increases with age [2]. Especially, the elderly are bio-socially at higher risks than other age groups [3, 4]. Numerous symptoms in the elderly are atypical. Furthermore, poor immune responses and underlying diseases put the elderly at a much higher risk for coronavirus infection and death, compared to other age groups [5]. Epidemiological research emphasizes our insufficient knowledge about Coronavirus Disease 2019 (COVID-19) [6]; there remain several questions about the relationship between different variables in the incidence of this disease. This study aimed to identify the association between some risk factors and Coronavirus Disease 2019 (COVID-19) in middle age and old age groups.

2. Methods and Materials

This cross-sectional study used the data of continuous registration of suspected COVID-19 cases in Shahroud City, Iran (plan 98126). In this comprehensive study, the form related to information, baseline, and having diseases for all suspected individuals referring to the registration centers in Shahroud University of Medical Sciences from February 20 to June 20, 2020, was registered. In this study, the basis for the initial diagnosis of COVID-19 in clients was a positive Reverse Transcription Polymerase Chain Reaction (RT-PCR) test based on nasal or nasopharyngeal swap or Computed Tomography (CT) scan. The inclusion criteria of this study were the referral of individuals aged over 50 years who were suspected of having the disease to the COVID-19 registration centers at the university. The basis for determining the age of 50 years as a criterion for entry was the possible study of problems from middle age [7]. The data used included demographic information, such as age, gender, educational level, occupational status, Body Mass Index (BMI), as well as history of smoking and underlying diseases. The method of measuring all demographic variables and the history of the disease was self-reported. To observe all ethical issues, the research license was obtained from the Vice Chancellor for Research of the University (Code:1399.052 IR.SHMU.REC). All research participants provided a signed informed consent form. The study subjects were assured that their provided information remains confidential.

Data analysis was performed using SPSS. Percentage and frequency were used concerning descriptive statistics. In the inferential statistics section, the Independent Samples t-test for quantitative variables and Chi-squared test for quali-

Table 1. The relationship between some variables and COVID-19 by the univariate and multivariate logistic regression models

Underlying Diseases		Univariate Logistic Regression		Multivariate Logistic Regression	
		OR (95%CI)	P	OR (95%CI)	P
BMI		(1.02-1.06) 1.04	0.001	(1.01-1.06) 1.04	0.002
Gender	Female	Reference	0.135	Reference	0.616
	Male	(0.68-1.33) 0.85		(0.75-1.17) 0.94	
Smoking*	No	Reference	0.503	Reference	0.500
	Yes	(0.87-1.33) 1.08		(0.84-1.35) 1.08	
Diabetes	No	Reference	0.001	Reference	0.014
	Yes	(1.17-2.90) 1.41		(1.07-1.78) 1.38	
Educational level	Illiterate	Reference	0.141	Reference	0.131
	Other classes	(0.82-1.03) 0.92		(0.81-1.03) 0.91	
Heart disease	No	Reference	0.678	Reference	0.337
	Yes	(0.84-1.30) 1.05		(0.74-1.13) 0.89	
Underlying diseases**	No	Reference	0.018	Reference	0.068
	Yes	(1.06-1.87) 1.41		(0.98-1.78) 1.32	

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*Smoking in the past or present

**Asthma, acute respiratory disease, liver and kidney conditions, and cancer

tative variables, as well as univariate and multivariate logistic regression models were used. The collected data were also managed to identify outdated, irrelevant, and missing data.

3. Results

Out of 3945 patients suspected of having COVID-19, after eliminating the missing cases, 1348 individuals were over 50 years of age. Of these, 602 were diagnosed with COVID-19. The Mean±SD age of the study participants was 66.62±11.33 years. The highest majority of the examined patients were hospitalized (83.8%) and retired or housewives (80.6%). The highest proportion of patients were males (50.3%) and in the age group of 60-69 years (34.1%).

Based on the obtained results, a significant relationship was observed between BMI (P=0.001) and COVID-19. The reports of the study of clients suspected of COVID-19 in terms of disease history suggested that among the patients aged over 50 years, 801(59.4%) had cardiovascular disease, 348(25.8%) diabetes, 121(9%) chronic kidney disease, 90 (6.7%) asthma, 45(3.3%) cancer, 33(2.4%) chronic liver disease, and 20(1.5%) had acute respiratory disease. The highest prevalence of underlying diseases in definitive patients with COVID-19 was related to heart disease (41.2%), diabetes (30.1%), chronic kidney disease (9.5%), and asthma (8.6%). Among these patients, a significant association was observed between the underlying diseases of asthma and diabetes and COVID-19.

Due to the small frequency of some underlying diseases, such as asthma, acute respiratory disease, liver conditions, kidney diseases, and cancer, these patients were combined and entered into the model as a variable of underlying disease. Table 1 presents the relationship between some variables and COVID-19 by the logistic regression model. According to the univariate logistic regression findings, BMI, diabetes mellitus, and underlying diseases were associated with COVID-19; increased BMI unit by 4% and diabetes by 41% increased the risk of COVID-19. All variables were entered into a multivariate regression model by the Entering method to calculate their simultaneous effects. After entering the variables into multivariate logistic regression and observing the effects of individual variables in the presence of other variables, almost similar results were obtained for univariate regression. In this model, increasing each unit of BMI by 4% and diabetes by 38% increased the odds of developing COVID-19. Furthermore, having any underlying diseases, including asthma, acute respiratory disease, liver, and kidney conditions, and cancer borderline increased the risk of COVID-19 by 32%.

4. Discussion and Conclusion

This study signified significant findings by emphasizing the identification of risk factors for COVID-19 in the middle age and old age populations. One of the essential findings in this study was to identify a significant relationship between BMI and COVID-19 in the elderly (P=0.002). In other words, for each unit increase in BMI, there was a 4% increase in the risk of developing COVID-19 disease. In addition, the collected results indicated an association between having diabetes and generating COVID-19 (P=0.014); accordingly, a history of diabetes increased the risk of COVID-19 by 41% and the disease in the presence of other variables also increased the risk by 38%. The collected results also revealed that high BMI and diabetes in middle-aged and elderly participants are important risk factors for developing COVID-19.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of the Shahroud University of Medical Sciences (Code: IR.SHMU.REC 1399.052). All ethical principles are considered in this article. The participants were informed about the purpose of the research and its implementation stages. They were also assured about the confidentiality of their information and were free to leave the study whenever they wished, and if desired, the research results would be available to them.

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Authors' contributions

Conceptualization: Marzieh Rouhani Rasaf, Ali Dadgari, Seyed Mohammad Mirrezaei and Yasman Alaghemand Gheshlaghi; Research: Marzieh Rouhani Rasaf, Ali Dadgari, Seyedeh Solmaz Talebi, Seyed Mohammad Mirrezaei and Yasman Alaghemand Gheshlaghi; Editing and finalization written: Ali Dadgari, Seyed Mohammad Mirrezaei and Seyedeh Solmaz Talebi, Marzieh Rouhani Rasaf.

Conflicts of interest

The authors declared no conflict of interest.

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