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Frailty and Mental Health Disorders Before and During COVID-19 Occurrence in Older Population in Iran: A Longitudinal Repeated-Measures Study

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Abstract

Purpose: Iranians' worry over the number of older patients negatively impacted by COVID-19 surged dramatically throughout the 5 waves of the COVID-19 pandemic, which lasted from January 2020 to September 2021. The goal of this research was to assess the physical and mental health of Iranian older persons throughout the COVID-19 pandemic's major waves. **Methods:** The health condition of 507 older persons with a positive examination for COVID-19 illness was assessed before and throughout the 5 waves of coronavirus in south Iran in analytical and hybrid longitudinal research. **Results:** The primary consequences of COVID-19 incidence on frailty and mental health issues were revealed in this investigation. Using a linear mixed model, we found a reduction of 0.33 in loneliness ($\beta = -.33$, 95% CI −0.39 to −0.26) during the COVID-19 pandemic. The probabilities of becoming depressed, anxious, or frail rose 4.61 (95% CI: 3.77-5.63), 1.85 (95% CI: 1.52-2.24), as well as 1.42 (95% CI: 1.17-1.42) time, subsequently, with COVID-19 occurrence, according to the mixed logistic models. Furthermore, the influence of COVID-19 incidence on loneliness result differs by gender; for depression, it varies by education; and for anxiety, it changes by comorbidities and living independently. **Conclusion:** The COVID-19 pandemic significantly impacts the mental health and frailty of older persons with the positive COVID-19 situation, and this scenario is gender-based too.

Keywords

mental health, frailty, older adults, SARS-CoV-2, COVID-19, pandemic

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Highlights

- Iranian Older adults have been affected by COVID-19 pandemic More than expected.
- Depression is the biggest challenge for them during pandemic.
- Gender plays a key role on the adverse effects of pandemic on Iranians' mental health and frailty.
- The destructive effects of epidemics have a feminine construct.

Background

Following a description of atypical pneumonia in Wuhan, China, ample research have been conducted on this illness from December 2019. The novel Coronavirus was verified by the China CDC Headquarters on January 7, 2020, and the new illness was named COVID-19 after samples collected from patients' upper respiratory parcels were verified by RT-PCR WHO. Within a month, the illness had spread to other nations, prompting the World Health Organization to declare a reasonably high worldwide risk of the pandemic in June 2020.[1]

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Table 1. Five Waves of Coronavirus Pandemic in Iran.

Waves	Beginning from . . .	End to . . .	Max. new cases in 1 day	Max. deaths in 1 day
1st	March 17, 2020	April 10, 2020	3186	158 (April 4, 2020)
2nd	June 25, 2020	July 26, 2020	3574	235 (July 28, 2020)
3rd	October 23, 2020	November 27, 2020	14051	486 (November 16, 2020)
4th	March 25, 2021	May 21, 2021	25582	496 (April 26, 2021)
5th	June 28, 2021	September 26, 2021	50228	709 (August 23, 2021)

Total confirmed cases: 6258181, total confirmed deaths: 132251 until January 25, 2022.
Ref.: "COVID-19 kills 364 more Iranians over past 24 hours." *IRNA*. 17 September 2021. Retrieved 17 September 2021 and "*Tejarat News*." 24 September 2021, Retrieved from: https://tejaratnews.com/.

Iran was one of the nations afflicted by the pandemic outbreak. After exceeding the description for COVID-19 pandemic patients in Iran for a week, it appears that the southern parts of Iran underwent the fifth wave. Each coronavirus epidemic wave in Iran has been more prevalent than the previous one. The fifth wave of sickness and mortality in Iran (709 reported fatalities day-to-day) peaked on August 23, 2021, the greatest official reported dying rate in a single day since the beginning of coronavirus pandemic (October 23, 2019). The incidence rate surpassed the previous wave on the day Tehran began a 6-day official vacation. Since then, the document for the latest rooted patients has been violated daily, with 50228 unique patients in 1 day (August 17, 2021). However, there have been 6258181 verified COVID-19 cases for the first time in weeks, with 132251 deaths. As of January 25, 2022, a totality of 53651657 (62.4% of the population) received 2 vaccine doses,[2] and 14856764 persons (17.3% of the population) obtained the booster vaccine. It must be added that Iran got engaged in the sixth wave of the latest Omicron version at the start of February 2022 while this manuscript was being written.

The psychological and physical effects of the COVID-19 pandemic on young and older persons are still under research, with just a few papers documenting the mental health issues like the sense of loneliness and depression in relation to the COVID-19 pandemic.[3-7] This study used telephone interviews to assess the physical and mental health of 517 older people contaminated with coronavirus throughout 5 pandemic waves of COVID-19 illness in *Farzanegan Daily Caring Foundation* (FDCF) in southern part of Iran (March 17, 2020, to end September 2021). The outcomes measures correspond to those obtained prior to pandemic according to the Mental Health Survey (2018 until now). In the process of preparing the final version of this paper (August 1st, 2022), Iran is at the beginning of the seventh wave of the pandemic.

Materials and Methods

Participants and Sample Size

This is a 2-year (2020 and 2021) analytical and longitudinal research to measure the mental health and frailty of older persons who are 60 years old and above in southern parts of Iran throughout the coronavirus pandemic. Data were collected by telephone from 517 older persons with positive coronavirus examination by RT-PCR in the first wave of pandemic which was recorded names of affected citizens in the *SiB* (Iranian health information registration system like NHS of UK) from March to April 2020 with the regulations of the National Pandemic Control Headquarters (CRONOMY.IR). It must be emphasized that data was collected on these samples (518 older patients) from the collection of 9200 samples covered by the Mental Health Survey (2018 until now) were affiliated with FDCF in the south Iran. That is, this number of older patients was randomly achieved from the initial study and studied in the next 5 waves of the coronavirus pandemic. Utilizing PASS software[8] version 15 and a mean score of 23.2 in the agoraphobia measure (SD = 6.4), energy 95%, SE = 0.05, and impact dimensions = 0.705, the sampling dimension was 518 (with a dropout rate of 13%) (Table 1). The membership number in the Health File Archive was used to identify eligible samples. In this study, 14 social workers and geriatric nurses with professional training in face-to-face and telephone survey conducted interviews with participants. The samples were identical at all phases and the data were collected between 9 a.m. and 6 p.m. The first interviews have been done during March to April 2020 (the first national wave), and then later on, each interview was conducted at the beginning of the each 5 waves. The same interviewers were conducted the follow-ups throughout the study. In total, 3071 interviews were conducted (See Table 2).

All professional, medical, and ethical standards, the research purposes of the study, and the older adult's right not to be involved in the study were mentioned at the beginning of the telephone interviews. The formal consent was read at the beginning of the telephone survey. The participant was requested to repeat the words "I, Mrs. / Mr. . .. . . represent my agreement to take part in the research on the date. . .." The consent was achieved prior to the interviews for data collection. It was maintained with the task pollsters as an audio note. The participants had to also be physically and mentally capable of answering the questions during the phone interviews and own a positive COVID-19 test

Table 2. Data Collection and Analysis Procedure Across 5 Waves of Coronavirus Pandemic.

Waves	Included (Date)	Excluded (death)
Before pandemic	518 (June 1, 2019)	0
1st	517 (April 12, 2020)	1
2nd	511 (July 27, 2020)	6
3rd	509 (November 29, 2020)	2
4th	509 (May 23, 2021)	0
5th	507 (September 20, 2021)	2
Analysis	507 (December 30, 2021)	0

according to the National Health Information Registration System (SiB). Exclusion criteria were death, refusal to participate in the research, and failure to return phone calls.

Measurement

A total of 6 accurate survey forms were utilized in this study. All the instruments were translated and validated according to the WHO guideline for translating and validating research scales, except for the demographic questionnaire.[9]

(1) A demographic and healthiness survey forms 21 demographic, family, and healthiness items.
(2) Five-item Frailty Phenotype Index,[10] with a full score degree of 0 to 5. Then, total frailty score was dichotomized to <1 as non-frail versus ≥ 2 as frail for the statistical models.
(3) Health in general, 1-item: full score degree of 1 to 4, the representatives' health situation was requested as 1 = Poor: my healthiness seriously restricts my abilities, 2 = not bad nor fine: I have fine days as well as imperfect days, 3 = Healthy: I have rare issues that are well-organized, & 4 = Very Healthy: I feel fine.
(4) Depression Sensitivity: 4-item Geriatric Depression Scale (GDS),[11] full score content of 0 to 4. Next, total depression score was dichotomized to <1 as no depression versus ≥ 2 as depressed for the statistical models.
(5) Anxiety Sense: 5-item Geriatric Anxiety Index (GAI),[12] full score content of 0 to 5. After that, total anxiety score was dichotomized to <2 as no anxiety versus ≥ 3 as anxious for the statistical models.
(6) UCLA-Loneliness, 20 objects,[13] full score content of 20 to 80. Loneliness considered as a continuous variable for the statistical models.

The McDonald's omega coefficient was calculated as a scale's reliability coefficient, and the scores were valid for each instrument, $\omega \geq 0.85$, ICC ≥ 0.72 ($P \leq .05$).

Statistical Analysis

Because the allocation of constant Parameters was skewed, flat data were informed utilizing commonness and percentage, while continuous variables were characterized using the median and interquartile degree. The effect of COVID-19 on the mental health of the older people was investigated using a linear mix model for loneliness and a mixed logistic standard for depression, anxiety, and frailty, meaning that after reshaping the data into a "long" format, we used linear mix model for loneliness outcome which is a continuous variable, and Since frailty, depression, and anxiety are binary variables, we used mixed logistic models. By multiplying the COVID-19 circumstance period and the indicated factors in the hybrid models, the interaction impact among gender, age, education, comorbidity, living independently, and Corona circumstance was also evaluated. The loneliness result was quantile adjusted to produce a conventional normal distribution after reshaping the data into a "long" format. For normalized loneliness, the data is first transformed to a percentile (fractional) level. The computed coefficients are interpreted as a common mean contrast using the typical normal allocation quantile operation.

Results

This research included 507 older persons contaminated throughout the COVID-19 pandemic (40.4 men and 59.6% woman). Table 3 depicts the participants' mental health conditions. According to the findings, in mid-2021, the average age of contributors was 76.6 (SD = 8.7), 89% had a comorbidity (38.8% cardiovascular illness), 44.5 and 48.3% were widowed and married, consequently, and 30.23% had elementary school level of education. About 58.2% of older samples received no financial assistance and/or pension, and their monthly revenue was shorter than 143 US dollars (n = 295), much below the national deprivation acceleration, and the social security procedure and insurance supported most of the representatives.

As Table 3 shows, almost 75% of samples do not live lonely. Depression, anxiety, and frailty have become health issues for older persons throughout the pandemic waves. In addition, throughout the COVID-19 waves, women's frailty climbed to 66.65% and 65.88%, respectively, while the median loneliness score boosted from 58 (IQR = 56-76) to 60 (IQR = 50-71). For older males, this score ranged from 65 (IQR = 61-76) to 60 (IQR = 50-72).

In model 1, the primary impact of COVID-19 on frailty and mental health issues are seen in the Table 4. Utilizing an unbent hybrid representative, we found a reduction in loneliness of 0.33 ($\beta = -.33$, 95% CI −0.39 to −0.26) throughout the COVID-19 pandemic waves. Because the loneliness scores are standardized, the calculated coefficients in the linear mix model may be regarded as standardized mean

Table 3. Characteristics of the Study Participants According to Frailty and Mental Health Disorders Before and During COVID-19 Occurrence.

	Its Subdomains	Total		UCLA-Loneliness		GDS		GAI		Frailty Phenotype Index	
	Median (IQR)	Number	Percent	Before	During	Before	During	Before	During	Before	During
Variables				Median (IQR)	Median (IQR)	Percent	Percent	Percent	Percent	Percent	Percent
Age at COVID-19 occurrence	76 (70-83)	-	-	-	-	-	-	-	-	-	-
Gender											
	Female	302	59.57	58 (56-76)	60 (50-71)	38.54	77.66	45.37	65.17	57.62	66.56
	Male	205	40.43	65 (61-76)	60 (50-72)	37.75	71.39	53.31	64.90	58.05	65.37
Education											
	Illiterate or basic	204	40.24	62 (58-76)	61 (50-72)	41.67	72.25	50.49	66.47	56.86	65.88
	Intermediate or high	303	59.76	63 (58-76)	59 (50-72)	35.64	75.05	49.83	64.03	58.42	66.20
Comorbidity											
	No	56	11.05	76 (52-76)	59 (50-69)	41.07	75.71	50.49	66.47	69.64	67.86
	Yes	451	88.95	64 (58-76)	61 (50-72)	37.69	73.70	49.83	64.03	56.32	65.85
Living alone											
	No	378	74.56	64 (58-76)	61 (50-71)	38.89	73.97	48.15	65.61	58.47	65.71
	Yes	129	25.44	65 (58-76)	60 (50-73)	35.66	73.80	55.81	63.26	55.81	66.07

Abbreviation: IQ, interquartile range.

Table 4. The Effect Estimates of COVID-19 Occurrence on Frailty and Mental Health in Older Population.

		UCLA-Loneliness				GDS				GAI				Frailty Phenotype Index			
Models	Variables	β	95% CI		*P*-value	OR	95% CI		*P*-value	OR	95% CI		*P*-value	OR	95% CI		*P*-value
Model 1																	
	COVID-19 occurrence	−0.33	−0.39	−0.26	<.001	4.61	3.77	5.63	<.001	1.85	1.52	2.24	<.001	1.42	1.17	1.72	<.001
Model 2																	
	COVID-19 occurrence	−0.33	−0.39	−0.26	<.001	4.61	3.78	5.64	<.001	1.85	1.52	2.24	<.001	1.42	1.17	1.72	<.001
	Age[a]	−0.07	−0.13	−0.01	.01	1.07	0.89	1.29	.41	0.93	0.78	1.10	.42	1.06	0.89	1.27	.47
	COVID-19 occurrence × age	.05	−0.01	0.12	.09	0.97	0.79	1.19	.83	1.10	0.90	1.33	.32	0.88	0.73	1.08	.24
Model 3																	
	COVID-19 occurrence[b]	−0.20	−0.32	−0.07	.001	5.54	4.03	7.61	<.001	2.25	1.66	3.05	<.001	1.36	1.00	1.85	.04
	Gender	.14	0.01	0.26	.02	0.96	0.67	1.39	.85	1.37	0.96	1.96	.07	0.98	0.68	1.40	.92
	COVID-19 occurrence × gender	−0.21	−0.36	−0.07	.002**	0.74	0.49	1.11	.15	0.71	0.48	1.06	.09	1.07	0.72	1.59	.72
Model 4																	
	COVID-19 occurrence	−0.29	−0.39	−0.19	<.001	3.64	2.67	4.97	<.001	1.94	1.43	2.63	<.001	1.46	1.07	1.98	.01
	Education	.09	−0.01	0.21	.10	0.77	0.53	1.11	.17	0.97	0.68	1.38	.88	1.06	0.74	1.52	.72
	COVID-19 occurrence × education	−0.06	−0.19	0.06	.32	1.48	0.99	2.23	.05**	0.92	0.62	1.36	.68	0.95	0.64	1.41	.80
Model 5																	
	COVID-19 occurrence	−0.44	−0.68	−0.19	<.001	4.47	2.45	8.13	<.001	1.09	0.60	1.98	.76	0.92	0.49	1.71	.79
	Comorbidities	−0.11	−0.34	0.12	.34	0.86	0.49	1.52	.62	0.56	0.31	1.00	.05	0.56	0.30	1.02	.05
	COVID-19 occurrence × comorbidities	.12	−0.13	0.37	.35	1.03	0.54	1.95	.91	1.79	0.95	3.36	.06**	1.62	0.84	3.13	.14
Model 6																	
	COVID-19 occurrence	−0.34	−0.41	−0.26	<.001	4.46	3.54	5.62	<.001	2.05	1.64	2.56	<.001	1.36	1.08	1.70	.007
	Living alone	−0.01	−0.14	0.11	.80	0.87	0.57	1.31	.51	1.36	0.91	2.03	.13	0.89	0.59	1.34	.59
	COVID-19 occurrence × living alone	.02	−0.12	0.17	.73	1.13	0.71	1.80	.58	0.66	0.42	1.03	.06**	1.18	0.76	1.85	.45

Abbreviation: IQR, interquartile range.

[a]Age was z-scored, and COVID-19 occurrence is a binary variable. COVID-19 occurrence is coded as before (0) or during (1) COVID-19 occurrence. Variables in mixed model, including gender, education, comorbidities, and living alone, were binary variables. Coefficients for these variables in linear mixed model, that is, for loneliness outcomes, can be interpreted mean group differences. For example, gender = 0.14 shows when COVID-19 accounting.

[b]For COVID-19 occurrence, on average, females scored 0.14 higher than male. Since loneliness outcome standardized (M = 0, SD = 1), the interpretation of regression coefficients for binary variables are like a standardized mean difference.

**Sig. ≤ .01.

difference. Furthermore, as compared to before the pandemic, the probabilities of becoming depressed, anxiety, and/or frail rose 4.61 (95% CI: 3.77-5.63), 1.85 (95% CI: 1.52-2.24), and 1.42 (95% CI: 1.17-1.42) time, consequently, during COVID-19 incidence.

To see whether increasing in frailty and mental health problems occurred disproportionately in particular groups, we looked at the interaction effects of age, gender, education, comorbidities, and living independently with COVID-19 incidence (models 2-6 in Table 4). The impact of COVID-19 circumstance on loneliness differs by gender ($\beta = -.21$, 95% CI −0.36 to −0.07), and the impact of COVID-19 circumstance on depression outcome varies by education (OR = 1.48, 95% CI: 0.99-2.23), as well as comorbidities (OR = 1.79, 95% CI: 0.95-3.36) and living independently (OR = 0.66, 95% CI: 0.42).

Discussion

The COVID-19 pandemic began as a physical phenomenon that primarily affected people's health. However, it has now evolved into a multifaceted reality. Basic mental health deficits, like worriedness, fear, depression, labeling, avoidant behaviors, irritability, sleep difficulties, and post-traumatic anxiety illness, are common during epidemics and natural catastrophes.[14,15] Individual mental health is important in such scenario since people from all walks of life may feel anxious as a result of the COVID-19 epidemic. Throughout the 2-year COVID-19 pandemic in the Middle East and Iran, the psychological impacts of the COVID-19 pandemic are yet unknown. Because of the disease's tenacity, companionships, relationships, families, and education have all been disrupted. Unemployment is on the rise, and persons contaminated with the coronavirus suffer from a variety of psychological effects as a result of their sickness. This problem affects older persons as well, particularly when it is said that the sickness has a higher effect on them and that their mental health is harmed.[16,17] They feel well when their children are around. In this circumstance, particularly those with a history of depression or Alzheimer's disease, they should not have been alone since this separation limits in-person visits. Loneliness has made them unhappy and bored.[18,19] As a result, this research compared the frailty and mental health conditions (anxiety and depression) of 507 older adults contaminated with coronavirus throughout 5 pandemic waves of COVID-19 illness in south Iran.

The pandemic has also impacted the mental health index which is in line with previous research.[16,17,19] However, little research has compared their findings to those preceding the COVID-19 epidemic waves. It has assessed data from many pandemic waves.[20,21] The loneliness among senior adults in this study was reduced under the COVID-19 pandemic, which was a remarkable finding. We hypothesize that one reason is that older persons believe that the COVID-19 epidemic has severely curtailed other people's social relationships and that most individuals are alone.

Furthermore, during the pandemic's breakout, the indices of depression and anxiety, as influenced by factors like gender, schooling, comorbidities, and living alone, altered dramatically compared to previously. This suggests that the health state of older persons' representatives throughout the Coronavirus pandemic was influenced by the gender which is the novelty of the present research. Loneliness has been more prevalent among women. During the 2-year pandemic, illiterate older persons had a worse time controlling depressive symptoms. Anxiety among people with various conditions is out of control, and it has been worst over time. Although no significant variations were found in the frailty index, the likelihood of this indication arising in the future is much greater than before the epidemic. It is worth noting that a prolonged pandemic means an increase in frailty among the older people.

Conclusion

The vulnerable groups, such as older persons in pandemics and catastrophes, must be highlighted by policymakers and local authorities due to their diverse lived experiences. A weakness of the present research wad gaining patients' confidence to engage in the several trial during pandemic waves. Another concern was the mortality in the samples (11 deaths). The absence of face-to-face communication with the older adults may affected the participants' motivation to take part in the next trials across different waves.

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Author's Contributions

AA and ShM have assisted in conceptualization and design of the study, and oversaw data collection; MA has conducted data analysis and drafted the methods and results sections. TS has attended in data gathering and mining, study conceptualization, and reviewed the manuscript. All authors read and approved the final manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethical Approval and Consent to Participate

This study protocol was approved by the ethics committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1399.474). An informed consent for participation in the study was obtained from all participants. The ethics committee approved the procedure for verbal consent since the study is observational and respected the code of ethics as stated in the declarations of Helsinki.

Consent for Publications

None.

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Availability of Data and Materials

The data that support the findings of this study are available on request from the corresponding author.

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