

## Original article

# Health-related quality of life and associated factors among COVID-19 individuals managed with Indian traditional medicine: A cross-sectional study from South India



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## ABSTRACT

**Introduction:** Coronavirus disease-2019 (COVID-19) had a multidimensional impact on human life. It affects the health-related quality of life (HRQoL) which is a perceived measure of physical and mental health. We estimated the EuroQol utility value for COVID-19 and the associated factors for those managed at Siddha COVID care centres in Tamil Nadu.

**Methods:** A cross-sectional study was conducted by a telephonic interview of 2000 randomly selected COVID-19 adults tested positive during June 2020 to Jan 2021. We collected sociodemographic, clinical and EQ-5D-5L profile. Mean EQ-5D-5L summary utility values and EQ-VAS scores were estimated. Multivariate regression was used to examine the factors associated with EQ-5D-5L. Study protocol was approved by the Institutional ethics committee of Government Siddha Medical College, Chennai (GSMC-CH-3401/ME-2/050/2021). The committee waived the written informed consent considering the pandemic situation of emerging infectious diseases.

**Results:** We interviewed 1047 participants. Of the total 68% were males with the median age (IQR) of 38 (29–51) years. The mean EQ-5D-5L utility score and EQ-VAS scores are  $0.98 \pm 0.05$  and  $92.14 \pm 0.39$  respectively. COVID-19 asymptomatic group reported a mean utility score of  $0.99 \pm 0.03$  which is relatively more than the symptomatic group ( $0.97 \pm 0.06$ ). EQ-VAS score was also reported high among the asymptomatic ( $95.45 \pm 5.95$ ) than the symptomatic ( $91.40 \pm 8.69$ ) COVID-19.

**Conclusion:** The severity of illness and the comorbidity are significantly associated with a low HRQoL of COVID-19 patients.

## 1. Introduction

Majority of the Corona virus disease-2019 (COVID-19) affected individuals usually get better within weeks of illness. However, some may experience a wide range of new, returning, or ongoing health problems.<sup>1</sup> When compared to healthy controls and psychiatric patients a greater proportion of COVID-19 patients experienced impulsivity, insomnia and higher psychological impact of the outbreak in China.<sup>2</sup> A study from

Tamil Nadu had documented that one in four (24%) were experiencing at least one persistent symptom even after 12–14 weeks of COVID-19 illness.<sup>3</sup> Due to such ailments, COVID-19 has a multi-dimensional impact on health and also on several domains such as economy, behavior, lifestyle, and quality of life.<sup>4–6</sup> An individual's or group's perceived physical and mental health over time is Health-related quality of life (HRQoL).<sup>7</sup> Post-covid persistent symptoms may lead to functional limitation, impacting everyday life and leading to poor HRQoL.<sup>8,9</sup> A

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recent community-based cross-sectional study from southern India reported that at post 30 days, COVID-19 individuals had a significant reduction in HRQoL.<sup>10</sup> A Systematic review revealed that the frequency of post covid depression was not associated with severity of COVID-19.<sup>11</sup>

Globally, the countries have adapted diverse approaches depending on the available resources and infrastructure to respond to the COVID-19 pandemic. India's health care system has multiple treatment options apart from modern medicine. The COVID-19 care was offered through Care Centres, dedicated health centres and hospitals to ensure the optimal utilization of resources to provide care to the patients in India.<sup>12</sup> To strengthen healthcare delivery during this COVID-19 pandemic, the interventions of Ayush (Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy and Sowa rigpa)-the traditional medical systems of India were used by many states and Union Territories (UTs).<sup>13</sup> Siddha COVID care centres are one among the covid care initiatives taken by the Directorate of Indian Medicine and Homeopathy to manage asymptomatic, mild and moderate COVID-19 Tamil Nadu.<sup>12,14</sup>

However, there was no documentation of the HRQoL of the individuals managed in SCCC to understand the outcomes of such COVID-19 management. In this context, we did a cross-sectional study to estimate the EuroQol utility value of COVID-19 patients after Siddha management and explored factors associated with poor HRQoL.

## 2. Methods

### 2.1. Study design

We conducted a cross-sectional study.

### 2.2. Study participants

We included COVID-19 patients who were managed at SCCC in Tamil Nadu, southern region of India. The inclusion criteria were (i) the individuals aged 18 years and above, (ii) tested positive for SARS-CoV-2 through Reverse Transcription Polymerase Chain Reaction (RT-PCR) test irrespective of the time point of confirmation, and (iii) admitted in SCCC. The exclusion criteria were, (i) unwilling to participate, (ii) not available even after trying three times in an interval of 2 h, (iii) not able to speak in English or the Tamil language, (iv) patient died and (v) not able to contact due to wrong telephone number.

### 2.3. Sampling frame and sampling

We obtained the line list of all COVID-19 patients admitted and managed in all the 32 SCCC during June 2020–January 2021 from the Directorate of Indian Medicine and Homoeopathy. We selected 2000 patients by simple random sampling from a total of 10 281 patients.

### 2.4. Data collection

We informed the study purpose and benefits over phone and collected the data after obtaining their verbal consent. We collected the data using a structured questionnaire in English and Tamil.

If the participant was not available during the first call, we scheduled the interviews later according to the convenience of them. The participant could nominate a family member as a respondent if he/she was not in a position to answer due to any illness. The data collection tool includes the 5 L version of EQ-5D questionnaire in addition to socio-demographic, date of COVID-19 confirmation, clinical characteristics, hospitalization, and treatment details for COVID-19 management. We followed the World Health Organisation body mass index (BMI) criteria for classifying the respondents as underweight, normal, overweight, and obese.<sup>15</sup> Open Data Kit (ODK collect) mobile app was used for entering the data. We ensured built-in validation checks during data collection. We trained the interviewers in data collection/entry using a

question-by-question guide and mock interviews. During the data collection, we provided feedback and inputs after reviewing the data on a daily basis to ensure the quality of data.

**Health-related quality of life:** An individual's or group's perceived physical and mental health over time is Health-related quality of life (HRQoL).<sup>7</sup> We used the EQ-5D-5L questionnaire to estimate a summary utility value.<sup>16</sup> The questionnaire consists a set of descriptive questions and a visual analogue scale (VAS). The EQ-5D-5L descriptive system consist five dimensions: mobility, self-care, usual activity, pain/discomfort, and anxiety/depression, and each dimension has five levels: no problems, slight problems, mild, moderate problems, severe problems, and extreme problems. Each state is referred to be a five-digit number (11 111, 11 112 etc.). The questionnaire covers five dimensions of mobility, self-care, usual activities, pain/discomfort, anxiety/depression and explores five levels of problems specified as no problem, slight problems, moderate problems, severe problems, and unable to or extreme situations.<sup>16</sup> Since the tariff values for the Indian population is available, we used the reference population value-set of India to determine the quality of life index value of individual health states.<sup>17</sup> The ranking method of EQ-VAS was explained by the interviewer and it was made sure whether the participant understand the scoring system by letting them to repeat the method and then the response was recorded. The scores represent the ordinal rankings of the health outcomes, where '0' denotes the worst health state and '100' denotes the best health state from the patients' perspective.<sup>18</sup>

**Data management and analysis plan:** We computed summary statistics for socio-demographic variables, the dimensions of EQ-5D-5L utility scores, and EQ-VAS score. Mean with standard deviation (SD) is reported for normally distributed variables. Median with interquartile range (IQR) is reported for skewed variables. Numbers and frequencies are reported for categorical data for all the study characteristics. Normality of EQ-5D-5L utility scores and EQ-VAS were tested using Shapiro-Wilk test. Differences in associations for various aspects and the EQ-5D-5L utility source of the groups were analyzed using non-parametric Mann Whitney *U* test and Kruskal-Wallis one-way analysis of variance. We included potentially significant variables if  $p \leq 0.2$  in univariate analysis for the multivariable logistic regression model to investigate the factors for the EQ-5D-5L. We calculated the reporting problems as categorical responses in the EQ-5D-5L dimensions and stratified them according to socio-demographic characteristics, the total duration in months since RT-PCR positive for COVID-19, and the presence of comorbidities. We have reported the mean utility score with SD for the various elements. Using logistic regression, we calculated the crude and adjusted odds ratio (OR) with a 95% confidence interval (CI). We examined for confounders using directed acyclic graphs (DAGs) and compared the  $-2$  log-likelihood ratios of models with and without potential confounders and identified the significant confounders, adjusted for each covariate in the multivariable logistic regression model. We used STATA version-16 for our analysis.<sup>19</sup>

### 2.5. Human participant's protection

The institutional ethics committee (GSMC-CH-3401/ME-2/050/2021) of the Government Siddha Medical College, Chennai reviewed and approved the conduct of the study. The committee waived the written informed consent considering the pandemic situation of emerging infectious disease.

## 3. Results

### 3.1. Study participant's characteristics

**Socio-demographic:** We approached 2000 individuals and collected data from 1047 (52.4%) and included the same for analysis. A total of 953 were not included/excluded for various reasons (Fig. 1). Study participants' median age (IQR) was 38 (29–51), and 68% were males.

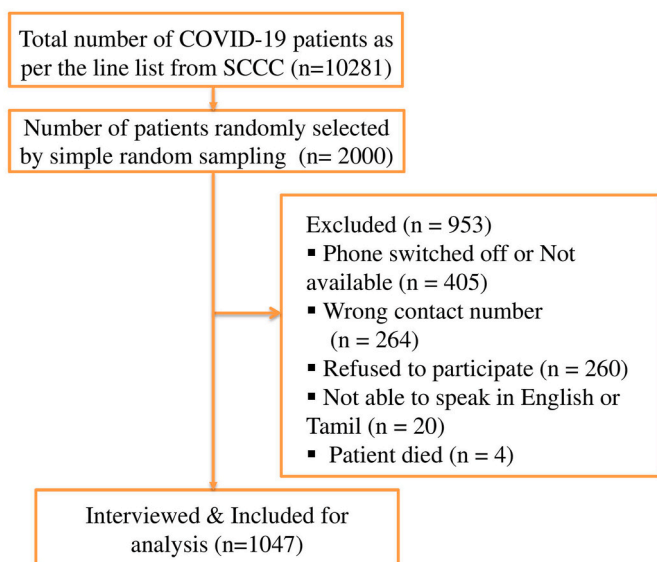


Fig. 1. Selection of study participants.

About half of the participants (47%) completed High school education.

**COVID-19:** Most patients (81.3%) approached SCCCs as the first choice for COVID-19 management during their active phase of illness. Majority of them were symptomatic (81%) during of COVID-19 illness. The time duration since confirmed for COVID-19 was about >7 months for 75.3%, and 5–7 months for 24.7% of the respondents.

**Comorbidities:** A little above half of the participants (52%) were overweight and obese. Twenty-five per cent were reported with anyone comorbidity, predominantly with diabetes (12.8%) and followed by hypertension (9.8%) (Table 1).

### 3.2. Health-related quality of life

The EQ-5D utility score and EQ-VAS scores [Mean ± SD] were 0.98 ± 0.05 and 92.14 ± 0.39, respectively. The EQ-5D utility score was higher among the respondents of 18–29 years than the other age groups [Kruskal Wallis H test, H (3) = 27.28,  $p < 0.001$ ]. Males had a higher EQ-5D-5L utility score than females ( $z = 3.571, p < 0.001$ ). Relatively a higher utility score was reported for asymptomatic ( $0.99 \pm 0.03$ ) compared to symptomatic ( $0.97 \pm 0.06$ ), H (1) = 5.43,  $p < 0.001$ . The EQ-VAS score is higher among asymptomatic participants ( $95.45 \pm 5.95$ ) than the symptomatic ( $91.40 \pm 8.69$ ), H (1) = 0.6.86,  $p < 0.001$ . Most study participants reported problems in the domain pain/discomfort (15%) followed by mobility (11.2%). A least number had (1.3%) reported problems in self-care. Individuals aged 45–59 had problems consistently in every domain such as mobility (39.3%), self-care (21.4%), usual activities (39.2%), pain/discomfort (34.4%), except anxiety/depression (35.2%). The age group 18–29 reported the least percentage of problems in all domains except anxiety/depression whereas 60 and above had the least percentage of problems (8.3%). Males had a higher proportion of problems when compared with females on all dimensions (Table 1).

**Health Related Quality of Life:** When we analyzed the domain and level wise problem by the respondents using EQ-5D (Supplementary Table 1), majority reported the level ‘no problem’ in mobility (88.8%), self-care (98.7%), usual activities (89.8%), pain/discomfort (85%) and anxiety and depression (89.7%). ‘Slight problem’ was reported by 13.3% for pain/discomfort, 10.2% in mobility, 9.5% in performing usual activities, 8.7% for anxiety/depression and 1.3% for self-care. ‘Moderate problem’ was seen in performing usual activities (8%), pain/discomfort (1.6%), anxiety/depression (1.3%) and in mobility (1%). Only Very few reported severe pain/discomfort (0.1%) and anxiety/depression (0.1%).

Table 1

Characteristics of COVID-19 patients managed in SCCC and EQ-5D-5L utility index and visual analogue (VAS) scores.

Characteristics	N = 1047 (%)	EQ-5D-5L utility score <sup>a</sup>		EQ-VAS score	
		Mean ± SD	p-value	Mean ± SD	p-value
<b>Age group (years)</b>			<0.001 <sup>b</sup>		<0.001 <sup>b</sup>
18–29	272 (26.0)	0.99 ± 0.05		93.84 ± 7.86	
30–44	377 (36.0)	0.98 ± 0.05		92.59 ± 7.45	
45–59	280 (26.7)	0.97 ± 0.06		90.66 ± 9.72	
60 and above	118 (11.3)	0.96 ± 0.06		90.34 ± 8.21	
<b>Gender</b>			< 0.001 <sup>c</sup>		0.136 <sup>c</sup>
Female	335 (32.0)	0.97 ± 0.07		91.49 ± 9.12	
Male	712 (68.0)	0.98 ± 0.05		92.45 ± 8.02	
<b>Residence</b>			0.416 <sup>c</sup>		0.038 <sup>c</sup>
Rural	477 (45.6)	0.97 ± 0.06		92.95 ± 7.41	
Urban	570 (54.4)	0.98 ± 0.05		91.47 ± 9.09	
<b>Education</b>			< 0.001 <sup>b</sup>		0.042 <sup>b</sup>
1st- 12th grade	491 (46.9)	0.97 ± 0.06		91.67 ± 8.84	
Bachelor’s degree	482 (46.0)	0.98 ± 0.05		92.21 ± 8.26	
Master’s degree	74 (7.1)	0.99 ± 0.03		94.86 ± 5.17	
<b>Occupation</b>			< 0.002 <sup>b</sup>		0.316 <sup>b</sup>
Do not work	61 (5.8)	0.96 ± 0.08		90.00 ± 9.79	
Student/Domestic work	244 (23.3)	0.97 ± 0.07		91.82 ± 9.27	
Professional/clerical/sales	558 (53.3)	0.98 ± 0.05		92.29 ± 8.20	
Agriculture	184 (17.6)	0.99 ± 0.04		92.83 ± 7.18	
<b>BMI</b>			0.979 <sup>b</sup>		0.473 <sup>b</sup>
Underweight	29 (4.1)	0.97 ± 0.08		90.86 ± 7.57	
Normal	311 (43.7)	0.98 ± 0.05		92.54 ± 8.25	
Overweight	268 (37.6)	0.97 ± 0.07		91.75 ± 9.17	
Obese	104 (14.6)	0.98 ± 0.05		91.92 ± 8.19	
<b>Comorbidity</b>					
Diabetes	134 (12.8)	0.96 ± 0.06	< 0.001 <sup>c</sup>	88.99 ± 8.71	< 0.001 <sup>c</sup>
Hypertension	103 (9.8)	0.96 ± 0.06	0.001 <sup>c</sup>	88.64 ± 10.29	< 0.001 <sup>c</sup>
Heart disease	20 (1.9)	0.92 ± 0.06	< 0.001 <sup>c</sup>	83.00 ± 11.05	< 0.001 <sup>c</sup>
Respiratory disease	10 (1.0)	0.95 ± 0.08	0.478 <sup>c</sup>	87.00 ± 7.89	0.025 <sup>c</sup>
Thyroid disorder	12 (1.2)	0.98 ± 0.03	0.709 <sup>c</sup>	94.58 ± 2.57	0.651 <sup>c</sup>
Other illness	41 (3.9)	0.94 ± 0.11	0.001 <sup>c</sup>	84.63 ± 12.42	< 0.001 <sup>c</sup>
<b>Duration since COVID-19 confirmed</b>			0.376 <sup>c</sup>		0.0.330 <sup>c</sup>
5–7 months	259 (24.7)	0.97 ± 0.06		92.20 ± 9.07	
>7 months	788 (75.3)	0.98 ± 0.06		92.12 ± 8.16	
<b>Symptom status of COVID-19</b>			< 0.001 <sup>c</sup>		< 0.001 <sup>c</sup>
Asymptomatic	199 (19.0)	0.99 ± 0.03		95.45 ± 5.95	

(continued on next page)

**Table 1** (continued)

Characteristics	N = 1047 (%)	EQ-5D-5L utility score <sup>a</sup>		EQ-VAS score	
		Mean ± SD	p-value	Mean ± SD	p-value
Symptomatic	848 (81.0)	0.97 ± 0.06		91.4 ± 8.69	
<b>EQ-5D-5L utility score<sup>a</sup> (mean ± SD)</b>	<b>0.98 ± 0.05</b>				

<sup>a</sup> Higher EQ-5D-5L utility scores and EQ-VAS scores indicate better health status/quality of life

<sup>b</sup> p-value (Kruskal Wallis test, level of significance was set at p<0.05)

<sup>c</sup> p-value (Mann-Whitney U test, level of significance was set at p<0.05)

The extreme level of anxiety/depression was reported by 0.2%.

**Determinants of HRQoL:** Mobility was significantly influenced by comorbid conditions (OR = 2.2, 95%CI = 1.3–3.6, *p* = 0.002), in people with symptomatic COVID illness (OR = 3.0, 95%CI = 1.3, 6.9, *p* = 0.009). Usual activities were significantly influenced by symptomatic COVID illness (OR = 4.8, 95%CI = 1.7–13.6, *p* = 0.003). Pain/discomfort was significantly influenced by the presence of comorbid conditions (OR = 1.6, 95%CI = 1.0–2.6, *p* = 0.045), in people with symptomatic COVID illness (OR = 2.7, 95%CI = 1.3–5.3, *p* = 0.005). Anxiety/depression was significantly associated with symptomatic (OR = 6.5, 95%CI = 2.0–21.3, *p* = 0.002). (Table 2 and Supplementary Table 1).

**4. Discussion**

With the lack of information in the current subject, we measured HRQoL among the COVID-19 individuals managed at Siddha medical

**Table 2**

Multivariate analysis for the association of participant characteristics and mobility (n = 117), pain/discomfort (n = 157).

Characteristics	Mobility					Pain/discomfort				
	n = 117 (%)	Univariate		Multivariate		n = 157 (%)	Univariate		Multivariate	
		OR [95% CI]	p-value	AOR [95% CI]	p-value		OR [95% CI]	p-value	AOR [95% CI]	p-value
Age group (years)										
18–29	9 (7.7)	Ref				22 (14.0)	Ref			
30–44	31 (26.5)	2.6 [1.2, 5.6]	0.013 <sup>†</sup>			45 (28.7)	1.5 [0.9, 2.6]	0.114 <sup>†</sup>		
45–59	46 (39.3)	5.7 [2.7, 12.0]	<0.001 <sup>†</sup>			54 (34.4)	2.7 [1.6, 4.6]	<0.001 <sup>†</sup>		
60 and above	31 (26.5)	10.4 [4.8, 22.7]	<0.001 <sup>†</sup>			36 (22.9)	5.0 [2.8, 9.0]	<0.001 <sup>†</sup>		
Sex										
Female	49 (41.9)	Ref				71 (45.2)	Ref			
Male	68 (58.1)	0.6 [0.4, 0.9]	0.016 <sup>†</sup>			86 (54.8)	0.5 [0.4, 0.7]	<0.001 <sup>†</sup>		
Residence										
Rural	57 (48.7)	Ref				71 (45.2)	Ref			
Urban	60 (51.3)	0.9 [0.6, 1.3]	0.467			86 (54.8)	1.0 [0.7, 1.4]	0.927		
Education										
1st- 12th grade	74 (63.3)	Ref		Ref		93 (59.2)	Ref		Ref	
Bachelor's degree	42 (35.9)	0.5 [0.3, 0.8]	0.002 <sup>†</sup>	1.0 [0.6, 1.6]	0.977	62 (39.5)	0.6 [0.4, 0.9]	0.010 <sup>†</sup>	1.0 [0.7, 1.4]	0.896
Master's degree	1 (0.9)	0.1 [0.0, 0.5]	0.012 <sup>†</sup>	0.1 [0.0, 0.9]	<b>0.047</b>	2 (1.3)	0.1 [0.0, 0.5]	0.003 <sup>†</sup>	0.2 [0.0, 0.7]	<b>0.018</b>
Occupation										
Do not work	14 (12.0)	Ref		Ref		11 (7.0)	Ref		Ref	
Student/Home maker/ Housewife	39 (33.3)	0.6 [0.3, 1.3]	0.202	0.9 [0.3, 2.4]	0.784	54 (34.4)	1.3 [0.6, 2.7]	0.485	1.4 [0.6, 3.7]	0.458
Professional/clerical/sales	52 (44.4)	0.3 [0.2, 0.7]	0.002 <sup>†</sup>	0.6 [0.2, 1.6]	0.278	79 (50.3)	0.7 [0.4, 1.5]	0.416	1.0 [0.4, 2.5]	0.966
Agriculture	12 (10.3)	0.2 [0.1, 0.5]	0.001 <sup>†</sup>	0.3 [0.1, 1.0]	0.054	13 (8.3)	0.3 [0.1, 0.8]	0.016 <sup>†</sup>	0.4 [0.2, 1.3]	0.142
BMI										
Underweight	2 (2.5)	0.5 [0.1, 2.2]	0.359			4 (3.6)	0.9 [0.3, 2.8]	0.921		
Normal	40 (50.6)	Ref				45 (40.5)	Ref			
Overweight	28 (35.4)	0.8 [0.5, 1.3]	0.369			46 (41.4)	1.2 [0.8, 1.9]	0.375		
Obese	9 (11.4)	0.6 [0.3, 1.4]	0.253			16 (14.4)	1.1 [0.6, 2.0]	0.820		
Duration since COVID-19 confirmed (months)										
5–7	31 (26.5)	Ref				42 (26.8)	Ref			
>7	86 (73.5)	0.9 [0.6, 1.4]	0.640			115 (73.2)	0.9 [0.6, 1.3]	0.526		
Presence of Comorbidities										
No	63 (53.8)	Ref		Ref		93 (59.2)	Ref		Ref	
Yes	54 (46.2)	2.8 [1.8, 4.2]	<0.001 <sup>†</sup>	2.2 [1.3, 3.6]	<b>0.002</b>	64 (40.8)	2.5 [1.8, 3.6]	<0.001 <sup>†</sup>	1.6 [1.0, 2.6]	<b>0.045</b>
Symptom status of COVID-19										
Asymptomatic	10 (8.6)	Ref		Ref		12 (7.6)	Ref		Ref	
Symptomatic	107 (91.4)	2.7 [1.4, 5.3]	0.003 <sup>†</sup>	3.0 [1.3, 6.9]	<b>0.009</b>	145 (92.4)	3.2 [1.7, 5.9]	<0.001 <sup>†</sup>	2.7 [1.3, 5.3]	<b>0.005</b>

COVID care centres in Southern Indian state of Tamil Nadu. We estimated that the mean utility score of EQ-5D-5L was low and extreme level of problem was not reported in any of the dimensions, except anxiety/depression among few. The older age group, female gender and those with comorbidity had persistent symptoms, and relatively low utility score for HRQoL.

In the current study non-response was noteworthy. Almost two of the five participants did not respond for the interview. Of these refused, close to 4% did so after contacting them, whereas the majority had mobile numbers wrongly entered or not reachable due to connectivity issues. In the context of COVID-19 pandemic, phone surveys have replaced in-person interviews<sup>20</sup> and published reports documented non-response in the range of 7–40%.<sup>3,21</sup>

A recent study from India reported the value sets for EQ-5D-5L and EQ-VAS, the states selected were Haryana, Uttar Pradesh, Gujarat, Odisha, and Tamil Nadu. Since our study setting is Tamil Nadu it is noteworthy to compare the values and other factors. The study population has reported the highest number of problems in the dimension of pain/discomfort, followed by anxiety/depression among all 5 dimensions of the EQ-5D-5L instrument as we reported in the current study.<sup>18</sup>

Low EQ-5D-5L utility score among the study participants is closer to that of values reported from another population-based study (0.93) from the same geographical setting on day 30 from the confirmation of COVID-19. Further, the previous study supports that the lower utility value is related to old age, comorbidity, and mild and moderate COVID-19 illness compared to other categories.<sup>10</sup> Findings from various regions of the world, such as China,<sup>22</sup> the United States,<sup>23</sup> Iran,<sup>8</sup> and Switzerland<sup>24</sup> report lower utility value among COVID-19 individuals as compared to the general population. As demonstrated in a structured review<sup>9</sup> on the impact of COVID-19 on HRQoL of patients, studies conducted in Belgium, Iran, Norway, and the UK were reported the EQ-5D-5L utility score mean value. Among them, the highest EQ-5D-5L mean utility score value was reported in the UK (0.714),<sup>25</sup> followed by Norway (0.690),<sup>26</sup> Belgium (0.620),<sup>27</sup> and the lowest in Iran (0.612).<sup>8</sup> However, all these studies were done in a minimum of 6 weeks and a maximum of 12 weeks after the onset of symptoms. A study of one-year follow-up of patients surviving COVID-19 reveals that, at 12 months, 12/41 participants still perceived moderate to severe symptoms of pain and discomfort and 13/41 slight-to-severe symptoms of anxiety and depression for HRQoL.<sup>28</sup> As estimated in the current study, the higher HRQoL score for male, younger patients compared to older and with mild and moderate COVID-19 illness was reported by Arab-Zozani et al.<sup>8</sup>

EQ-5D-5L and EQ-VAS utility scores were reported differently among various study population. National social distancing during the pandemic affected the HRQoL of Vietnamese [EQ-5D-5L – 0.95 ( $\pm 0.07$ ) and EQ-VAS 88.2 ( $\pm 11.0$ )]. As we reported in the current study the female gender is associated with lower HRQoL scores.<sup>29</sup> Another study among the diabetic population showed a reduced level of HRQoL with a mean scores of EQ-5D-5L 0.80 ( $\pm 0.20$ ) and EQ-VAS 57.5 ( $\pm 14.4$ ) as we seen the HRQoL of COVID-19 patients with comorbidities is relatively low with their counterparts.<sup>30</sup> A study conducted among the HIV patients with depression shown the scores of EQ-5D 0.8 ( $\pm 0.2$ ) and EQ-VAS 73.6 (15.3).<sup>31</sup>

The utility value difference in applying the EQ-5D-5L and EQ-VAS tool to through various mode such as online and text message have been reported. Equivalent results were obtained between telephone and patient-completed administration for the VAS and Utility Index of the EuroQol Survey in people with advanced hip or knee osteoarthritis,<sup>32</sup> another study from Norway estimated population norms from two general population surveys: (a) face-to-face and (b) online reported that the Online (n = 2018) mean utility and EQ VAS values were consistently lower than the face-to-face sample.<sup>33</sup> Text messaging is equivalent to paper-based measurement of EQ-5D in rural South African trauma setting and was reported as a viable tool for responders. Non-responders had similar socioeconomic characteristics and attrition rates to

traditional modes of administration. The EQ-5D by text message offers potential clinical and research uses in hard-to-reach populations.<sup>34</sup>

#### 4.1. Limitation

The current study had a few limitations. We conducted this study among the participants only from the SCCC, hence most of them presented with mild symptoms during COVID-19 illness, and moderate and severe patients are few in number. These factors may limit the generalizability of the study findings. We could not get an equal number of participants in the three groups based on the time since they tested positive for COVID-19. This prevented the comparison of the subgroups. Another limitation is that we have conducted telephonic interview in the current study which might have introduced some level of information bias.

#### 5. Conclusion

The EQ-5D-5L utility values are reported for the COVID-19 patients managed with Siddha system of medicine. Old age, female gender and the severity of COVID-19 illness are the factors associated with a low utility score and HRQoL.

#### Ethics committee approval

Ethics committee approval was taken from the Institutional Ethics Committee (GSMC-CH-3401/ME-2/050/2021) of the Government Siddha Medical College Chennai, and we obtained informed consent from all the study participants.

#### Authors contribution

E Rajalakshmi: Methods, Data curation, Formal analysis, Original draft.

Bagepally BS: Conceptualisation, Methods, Formal analysis, Review & editing.

Ponnaiah Manickam: Conceptualisation, Methods, Formal analysis, Review & editing.

Tarun Bhatnagar: Conceptualisation, Methods, Formal analysis, Review & editing.

Suganya Barani: Conceptualisation, Methods, Review & editing.

Poornima Kannan: Data curation and analysis, Review & editing.

Lakshmi Kantham: Review & editing.

P Sathiyarajeswaran: Review & editing.

D Sasikumar: Review & editing.

Post COVID-19 study team (Aruldevi, Gajalakshmi, Jayapriya, Kavitha, Manivasakam, Parvathy, Priya, Priyanka, Shakthi Parkavi, Sivamanisha, Srinivasan, Archana, Barani Priya, Krishnaveni, Krithika, Pushpalatha, Abinaya, Narrain Shree): Data collection

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#### Data availability

Supplementary file has two tables and STROBE checklist. Any other information regarding the study will be provided from the author on request.

#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.cegh.2023.101250>.

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