Comparison of physical activity levels in Spanish adults with chronic conditions before and during COVID-19 quarantine

Guillermo F. López-Sánchez[1]*, Rubén López-Bueno[2]*, Alejandro Gil-Salmerón[3]*, Roksana Zauder[4], Maria Skalska[5], Joanna Jastrzębska[6], Zbigniew Jastrzębski[7], Felipe B. Schuch[8], Igor Grabovac[9], Mark A Tully[10], Lee Smith[11]

[1] Faculty of Sport Sciences, University of Murcia, 30720 Murcia, Spain

[2] Department of Physical Medicine and Nursing, University of Zaragoza, Zaragoza, Spain

[3] Polibienestar Research Institute, University of Valencia, Valencia, Spain

[4] Faculty of Philology, University of Lodz, Łódź, Poland

[5] Department of Pediatrics, Diabetology and Endocrinology, University Clinical Centre in Gdansk, 80-210 Gdansk, Poland

[6] Department of Pediatrics, Diabetology and Endocrinology, Gdansk Medical University, 80-210 Gdansk, Poland

[7] Department of Health Promotion, Gdansk University of Physical Education and Sport, 80-336 Gdansk, Poland

[8] Department of Sports Methods and Techniques, Federal University of Santa Maria, Santa Maria, RS, Brazil

[9] Department of Social and Preventive Medicine, Centre for Public Health, Medical University of Vienna, Vienna, Austria.

[10] Institute of Mental Health Sciences, School of Health Sciences, Ulster University, Belfast, United Kingdom

[11] Cambridge Centre for Sport and Exercise Science, Anglia Ruskin University, CB1 1PT Cambridge, UK

*** Corresponding authors:**

- Guillermo F. López-Sánchez. Faculty of Sport Sciences, University of Murcia. C/ Argentina s/n, Campus de San Javier, 30720 - Santiago de la Ribera-San Javier (Murcia, Spain). Tel: +34 608 16 33 62 gfls@um.es

- Rubén López-Bueno. Department of Physical Medicine and Nursing, University of Zaragoza. No number, Domingo Miral, Zaragoza, 50009, Spain. Tel: +34 976 76 17 19. rlopezbu@unizar.es

- Alejandro Gil-Salmerón. Polibienestar Research Institute, University of Valencia. Carrer del Serpis, 29, 46022 Valencia, Spain. Tel: +34 687 40 19 99. alejandro.gil.salmeron@uv.es

ABSTRACT

Background: This is the first study analysing levels of physical activity in a sample of quarantined adults with chronic conditions. The aim of this study was to compare moderate-intensity and vigorous-intensity physical activity levels in Spanish adults with chronic conditions before and during COVID-19 quarantine.

Methods: A cross-sectional online survey was administered during the COVID-19 quarantine in Spain. A total of 163 participants with chronic conditions (113 females and 47 males; age range 18-64 years) completed the survey. A total of 26 chronic conditions were included. Participants self-reported average minutes/day of moderate and vigorous physical activity before and during quarantine. Differences in moderate-intensity physical activity and vigorous-intensity physical activity levels before and during COVID-19 quarantine (overall, by gender, by age, by number of chronic conditions and by each chronic condition) were assessed by Wilcoxon signed-rank test.

Results: During COVID-19 quarantine, there was a significant decrease of moderate-intensity physical activity in Spanish people with chronic conditions (in both males and females, in those aged 18-24, 25-34, 35-44 and 55-64 years, in those with multimorbidity, in those with one/two chronic condition/s, and in those diagnosed with asthma/hypercholesterolemia/chronic skin disease/hemorrhoids). Also, there was a significant decrease of vigorous-intensity physical activity in Spanish males with chronic conditions and in those with multimorbidity.

Conclusions: These results should be considered to develop effective strategies of physical activity promotion targeting these specific groups when new quarantine or restriction measures are implemented, in order to avoid new significant decreases of physical activity in these vulnerable populations.

Keywords: Physical activity; adults; chronic conditions; COVID-19; Quarantine.

1. INTRODUCTION

Coronavirus disease 2019 (COVID-19) was declared a global pandemic by World Health Organization (WHO) on the 11th March of 2020.[1] At the time of writing (20 July 2020), 14 043 176 cases have been diagnosed globally, resulting in 597 583 fatalities thus far.[2] Spain is among the countries with the highest number of cases, with a total of 260 255 cases diagnosed that have resulted in 28 420 fatalities thus far.[3] Due to the proven effectiveness of traditional public health measures interrupting human-to-human transmission of viruses[4], on 15th March of 2020 the Spanish Government approved a period of quarantine due to COVID-19, in order to fight the spread of the virus.[5,6]

During the quarantine period, the Spanish population were instructed to stay in their homes and, by consequence, interrupt their usual activities.[5,6] As prolonged home stays can increase behaviors that lead to inactivity, maintaining regular physical activity and routinely exercising in a safe home environment is an important strategy for healthy living during the coronavirus crisis.[7]

In this context, special attention should be paid to people with chronic conditions because they are a vulnerable group in the COVID-19 pandemic, as they have higher risk of severe disease and mortality owing to COVID-19.[8-10] Participating in regular physical activity during COVID-19 quarantine is important for people with chronic conditions because greater levels of physical activity in this population are associated with both positive affect and physical functioning.[11,12] Indeed, physical activity is a potential health promotion modality for people with chronic conditions,[13] as it may ameliorate associated depression, mobility difficulties and pain.[14]

Furthermore, as physical activity has shown to be an effective therapy for most chronic diseases with direct effects on both mental and physical health, physical activity has now been recommended as therapy to address the mental and physical consequences of COVID-19 quarantine.[15,16] Therefore, it is very important that, during quarantine periods, people with chronic conditions maintain adequate levels of physical activity by meeting the global recommendations on physical activity for health: at least 150 minutes/week of moderate-intensity physical activity, or 75 minutes/week of vigorous-intensity physical activity, or an equivalent combination of moderate- and vigorous-intensity physical activity.[17,18]

However, to the best of our knowledge no studies have been published yet analyzing the levels of physical activity in adults with chronic conditions before and during COVID-19 quarantine. Given this background, this study aimed to compare moderate-intensity and vigorous-intensity physical activity levels in Spanish adults with chronic conditions before and during COVID-19 quarantine (overall, by gender, by age, by number of chronic conditions and by each chronic condition), in order to identify specific groups that may require target physical activity interventions. It is hypothesised that in those with any chronic condition moderate intensity physical activity and vigorous intensity physical activity would had decreased from before to during COVID-19 quarantine.

2. METHODS

2.1. The survey

A cross-sectional online survey was administered during the COVID-19 quarantine in Spain. The Spanish quarantine started on the 15 March 2020.[18] This study followed the principles of the World Medical Association Declaration of Helsinki and was approved by the Ethics Committee of Research in Humans of the University of Valencia (1 April 2020; register code 1278789). The study lasted one month (from 1 April 2020 to 1 May 2020). On the 2nd May 2020 the gradual opening in Spain commenced and physical activity outdoors was allowed again, albeit with time restrictions.[19]

Spanish adults aged 18 years and over (age range of those who completed the survey 18-64 years) that were quarantined due to COVID-19 were eligible to participate. A convenience sample of participants were recruited through social media (e.g. Facebook, Twitter, Whatsapp). They were directed to a data encrypted website, where they indicated their consent to participate after reading an information sheet and they confirmed that they were in a quarantine situation. The data provided were anonymous and treated accordingly to Spanish law regarding general data protection. This manuscript was written in accordance with the STROBE Statement (Strengthening the Reporting of Observational studies in Epidemiology).[20]

2.2. Chronic conditions

Participants were asked: 'Have you ever been diagnosed by a health professional with any of the following chronic conditions? (tick all that apply)'. Chronic conditions included were: depression, anxiety, other psychiatric disorders, obesity, hypertension, varicose veins of lower extremities, osteoarthritis, chronic neck pain, chronic low back pain, chronic allergy excluding allergic asthma, asthma including allergic asthma, chronic bronchitis, diabetes type 2, cataracts, peptic ulcer disease, urinary incontinence or urine control problems, hypercholesterolemia, chronic skin disease, chronic constipation, chronic migraine and other frequent chronic headaches, hemorrhoids, cancer, osteoporosis, thyroid disease, renal disease and injury. This list of chronic conditions was based on the list of chronic diseases of the Spanish National Health Survey.[21] Multimorbidity was defined as the co-occurrence of two or more chronic conditions.

2.3. Physical activity

First, vigorous and moderate physical activity were described to participants: "Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal." Then, participants were asked: 1) How much time on an average day did you usually spend in moderate activity before quarantine? 2) How much time on an average day do you spend in moderate activity during quarantine? 3) How much time on an average day did you usually spend in vigorous activity before quarantine? 4) How much time on an average day do you spend in vigorous activity during quarantine? Responses were reported in minutes/day.

2.4. Statistical analysis

The statistical analysis was performed with SPSS 23.0 (IBM, NY, USA). The Kołmogorov–Smirnov test was applied to check normality. Differences in moderate-intensity physical activity and vigorous-intensity physical activity levels before and during COVID-19 quarantine (overall, by gender, by age, by number of chronic conditions and by each chronic condition) were assessed by Wilcoxon signed-rank test, providing the mean and standard deviation of each group, the mean difference, the Z-value

and the p-value. In addition, the effect size was calculated using Rosenthal's formula ($r = Z/\sqrt{N}$),[22] and it was classified as small (0.10), medium (0.30) and large (0.50).[23] There were missing data only on the following variables: gender (n=3: 1.84%) and age (n=3: 1.84%). Complete-case analysis was carried out (only participants for which we had no missing data on the variables of interest were included in the analyses, while participants with any missing data were excluded). The level of statistical significance was set at $p < 0.05$.

3. RESULTS

A total of 163 participants with chronic conditions completed the survey. The gender distribution was: males (n=47) and females (n=113). The age distribution was: 18-24 years (n=59), 25-34 years (n=52), 35-44 years (n=28), 45-54 years (n=11), 55-64 years (n=10). Distribution by number of chronic conditions was: 1 chronic condition (n=70), 2 chronic conditions (n=46), 3 chronic conditions (n=22), 4 chronic conditions (n=13), 5 chronic conditions (n=6), 6 chronic conditions (n=2), 7 chronic conditions (n=3), 8 chronic conditions (n=1). The number of participants with each chronic condition was: depression (n=23), anxiety (n=13), other psychiatric disorders (n=11), obesity (n=25), hypertension (n=17), varicose veins of lower extremities (n=20), osteoarthritis (n=4), chronic neck pain (n=14), chronic low back pain (n=18), chronic allergy excluding allergic asthma (n=22), asthma including allergic asthma (n=25), chronic bronchitis (n=5), diabetes type 2 (n=3), cataracts (n=4), peptic ulcer disease (n=2), urinary incontinence or urine control problems (n=1), hypercholesterolemia (n=25), chronic skin disease (n=21), chronic constipation (n=7), chronic migraine and other frequent chronic headaches (n=31), hemorrhoids (n=21), cancer (n=2), osteoporosis (n=6), thyroid disease (n=12), renal disease (n=11) and injury (n=8).

Moderate-intensity physical activity significantly decreased in Spanish people with chronic conditions during COVID-19 quarantine (mean difference: 30 min/day; $p<0.001$). This decrease was significant in both males (mean difference: 22.1 min/day; $p=0.006$) and females (mean difference: 33.2 min/day; $p<0.001$). Also, this decrease was significant in those aged 18-44 years and 55-64 years ($p<0.05$).

(Table 1a). Vigorous-intensity physical activity significantly decreased in Spanish males with chronic conditions during COVID-19 quarantine (mean difference: 15.5 min/day; p=0.025). **(Table 1b)**.

According to number of chronic conditions, moderate-intensity physical activity significantly decreased during COVID-19 quarantine in those with multimorbidity (mean difference: 30.1 min/day; p<0.001), in those with one chronic condition (mean difference: 29.9 min/day; p=0.001) and in those with two chronic conditions (mean difference: 34.8 min/day; p=0.002). **(Table 2a)**. Vigorous-intensity physical activity significantly decreased during COVID-19 quarantine in those with multimorbidity (mean difference: 11.4 min/day; p=0.045). **(Table 2b)**.

Regarding each chronic condition, moderate-intensity physical activity significantly decreased during COVID-19 quarantine in those diagnosed with asthma (mean difference: 26.2 min/day; p=0.026), hypercholesterolemia (mean difference: 39.0 min/day; p=0.011), chronic skin disease (mean difference: 44.3 min/day; p=0.004) and hemorrhoids (mean difference: 50.1 min/day; p=0.009). **(Table 3)**. There were no significant differences in vigorous-intensity physical activity by each chronic condition before and during COVID-19 quarantine. **(Table 4)**.

4. DISCUSSION

To our knowledge, this is the first study analysing levels of physical activity in a sample of quarantined adults with chronic conditions. The results of this study showed significant decreases of both moderate and vigorous physical activity during COVID-19 quarantine in Spanish people with chronic conditions. These results differ from a recent study that analysed physical activity levels during quarantine in Spanish adult general population (n=2741), which found an increase of physical activity.[24]

There are several plausible reasons to explain the physical activity reductions in Spanish people with chronic conditions that were observed in the present study and the difference with the results obtained in the general adult population.[24] First, people with chronic conditions are a vulnerable group and they experience a greater number of barriers to physical activity participation than the general adult

population,[25-28] and it is likely that it is more difficult to overcome these barriers during a quarantine situation. Second, quarantine due to COVID-19 could produce, in those with chronic conditions, feelings of loneliness, lack of social support and isolation, which are also associated with reductions of physical activity and chronic conditions.[29-33] Third, natural light and natural environment exposure deprivation during quarantine might lead to a negative mood state, which consequently, may predispose for less physical activity.[34] Fourth, the prohibition of doing physical activity outdoors (very frequent in Spain due to the good weather of the country), could highly contribute to this reduction in physical activity levels in people with chronic conditions, as Spanish people are more used to outdoor than indoor physical activity.

Also, the negative consequences that this significant reduction in physical activity can cause in people with chronic conditions should be considered in order to prevent other health problems. For example, several studies have reported that short-term physical inactivity (i.e.14 days) causes reversible metabolic derangements and changes in body composition.[35] Moreover, other negative short-term effects of physical inactivity are impaired endothelial function, arterial stiffness, increased arterial tone, insulin resistance, increased blood pressure and dyslipidemia.[36,37] Therefore, it is urgent and necessary to develop effective strategies of physical activity promotion in people with chronic conditions in order to avoid potential subsequent complications in their conditions.

The main strength of this study is that it is the first study reporting levels of physical activity in a sample of quarantined adults with chronic conditions. Another strength of the present study is the high number of chronic conditions included (a total of 26 chronic conditions). However, the present findings must be interpreted in light of the study limitations. First, physical activity and chronic conditions were self-reported, potentially introducing self-reporting bias into the findings. Second, analyses were cross-sectional and thus it was not possible to determine trajectories of physical activity during the whole period of quarantine. Third, due to the method of sampling (convenience sampling), there is the possibility of a selection bias.

5. CONCLUSIONS

During COVID-19 quarantine, there was a significant decrease of moderate-intensity physical activity in Spanish people with chronic conditions (in both males and females, in those aged 18-44 years and 55-64 years, in those with multimorbidity, in those with one/two chronic condition/s, and in those diagnosed with asthma/hypercholesterolemia/chronic skin disease/hemorrhoids). Also, there was a significant decrease of vigorous-intensity physical activity in Spanish males with chronic conditions and in those with multimorbidity. These results should be considered to develop effective strategies of physical activity promotion targeting these specific groups when new quarantine or restriction measures are implemented, in order to avoid new significant decreases of physical activity in these vulnerable populations. Owing to the restrictions imposed during quarantine the promotion of appropriate home-based exercises are required for those with chronic conditions, it may be best to promote exercise programs during quarantine online either utilising existing, or developing new, exercise programs. Moreover, simple brief exercise advice could also be provided.

Conflict of interest: None.

Funding: None.

Data availability: The data that support the findings of this study are available from the corresponding author, [GFLS], upon reasonable request.

Key points:

- First study analysing levels of physical activity in quarantined adults with chronic conditions.
- Significant decrease of physical activity in Spanish adults with chronic conditions.
- These results should be considered to develop strategies of physical activity promotion.

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TABLES

38. **Table 1.** Comparison of physical activity in minutes/day before and during COVID-19 quarantine (overall, by gender and by age)

a) MODERATE-INTENSITY		**n**	**Before**	**During**	**Dif.**	**Z**	**P-value [a]**	**r [b]**
Overall		163	90.5 (87.1)	60.5 (51.3)	-30.0	-4.692	< 0.001***	-0.259
Gender	Males	47	79.7 (61.0)	57.6 (44.9)	-22.1	-2.764	0.006**	-0.285
	Females	113	95.6 (95.9)	62.4 (54.0)	-33.2	-3.858	< 0.001***	-0.256
Age (years)	18-24	59	79.9 (64.3)	56.3 (42.6)	-23.6	-2.885	0.004**	-0.265
	25-34	52	100.2 (90.6)	77.0 (59.8)	-23.2	-2.084	0.037*	-0.204
	35-44	28	95.5 (113.8)	52.5 (52.2)	-43.0	-2.044	0.041*	-0.273
	45-54	11	99.1 (133.8)	37.3 (40.8)	-61.8	-1.854	0.064	-0.395
	55-64	10	90.5 (44.0)	43.4 (46.0)	-47.1	-1.961	0.049*	-0.438
b) VIGOROUS-INTENSITY		**n**	**Before**	**During**	**Dif.**	**Z**	**P-value [a]**	**r [b]**
Overall		163	40.6 (47.6)	34.6 (39.2)	-6.0	-1.449	0.147	-0.080
Gender	Males	47	55.7 (52.8)	40.2 (37.5)	-15.5	-2.241	0.025*	-0.231
	Females	113	35.3 (44.3)	32.7 (40.0)	-2.6	-0.482	0.630	-0.032
Age (years)	18-24	59	49.8 (51.4)	39.9 (38.0)	-9.9	-1.217	0.223	-0.112
	25-34	52	42.3 (51.4)	36.5 (44.5)	-5.8	-0.857	0.391	-0.084
	35-44	28	32.7 (38.7)	31.8 (37.6)	-0.9	-0.188	0.851	-0.025
	45-54	11	24.6 (35.0)	21.8 (30.3)	-2.8	-0.272	0.785	-0.058
	55-64	10	29.0 (32.8)	18.0 (30.5)	-11.0	-1.603	0.109	-0.358

39. Values are Average (Standard Deviation: SD).

40. [a] P-values were based on Wilcoxon signed-rank test. * P < 0.05. ** P < 0.01. *** P < 0.001.

41. [b] r = Z/√N; N=n*2; Small 0.10, Medium 0.30, **Large 0.50.**

42. **Table 2.** Comparison of physical activity in minutes/day before and during COVID-19 quarantine (by number of chronic conditions)

a) MODERATE-INTENSITY	**n**	**Before**	**During**	**Dif.**	**Z**	**P-value [a]**	**r [b]**
Multimorbidity [c]	93	97.4 (95.6)	67.3 (52.8)	-30.1	-3.429	< 0.001***	-0.251
1 chronic condition	70	81.4 (74.0)	51.5 (48.2)	-29.9	-3.263	0.001**	-0.275
2 chronic conditions	46	98.5 (86.5)	63.7 (56.0)	-34.8	-3.088	0.002**	-0.322
3 chronic conditions	22	76.4 (77.9)	60.7 (56.8)	-15.7	-0.966	0.334	-0.145
4 chronic conditions	13	117.8 (120.8)	83.1 (35.0)	-34.7	-1.080	0.280	-0.211
5 chronic conditions	6	135.0 (172.6)	71.7 (47.5)	-63.3	-0.730	0.465	-0.210
6 chronic conditions	2	105.0 (106.1)	135.0 (63.6)	+30.0	-1.000	0.317	**-0.500**
7 chronic conditions	3	100.0 (62.5)	60.0 (30.0)	-40.0	-1.069	0.285	-0.436
8 chronic conditions	1	0.0 (-)	30.0 (-)	+30.0	-	-	-
b) VIGOROUS-INTENSITY	**n**	**Before**	**During**	**Dif.**	**Z**	**P-value [a]**	**r [b]**
Multimorbidity [c]	93	44.6 (53.7)	33.2 (35.1)	-11.4	-2.000	0.045*	-0.146
1 chronic condition	70	35.2 (37.7)	36.4 (44.4)	+1.2	-0.073	0.942	-0.006
2 chronic conditions	46	43.6 (57.9)	28.7 (32.2)	-14.9	-1.918	0.055	-0.200
3 chronic conditions	22	45.5 (55.0)	33.4 (33.3)	-12.1	-1.182	0.237	-0.178
4 chronic conditions	13	52.3 (44.9)	51.9 (43.6)	-0.4	-0.344	0.731	-0.067
5 chronic conditions	6	35.0 (55.0)	37.5 (48.1)	+2.5	-0.447	0.655	-0.129
6 chronic conditions	2	30.0 (42.4)	15.0 (21.2)	-15.0	-1.000	0.317	**-0.500**
7 chronic conditions	3	65.0 (48.2)	35.0 (22.9)	-30.0	-0.534	0.593	-0.218
8 chronic conditions	1	0.0 (-)	0.0 (-)	0.0	-	-	-

43. Values are Average (Standard Deviation: SD).

44. [a] P-values were based on Wilcoxon signed-rank test. * P < 0.05. ** P < 0.01. *** P < 0.001.

45. [b] $r = Z/\sqrt{N}$; N=n*2; Small 0.10, Medium 0.30, **Large 0.50.**

46. [c] Multimorbidity is defined as the co-occurrence of two or more chronic conditions.

47. **Table 3.** Comparison of moderate-intensity physical activity in minutes/day before and during COVID-19 quarantine (by each chronic condition)

Chronic condition	n	Before	During	Dif.	Z	P-value [a]	r [b]
Depression	23	95.7 (112.6)	74.6 (64.9)	-21.1	-0.904	0.366	-0.133
Anxiety	13	150.0 (163.9)	65.8 (41.3)	-84.2	-1.637	0.102	-0.321
Other psychiatric disorders	11	90.5 (133.4)	64.1 (39.2)	-26.4	-0.119	0.905	-0.025
Obesity	25	69.6 (60.7)	54.0 (40.6)	-15.6	-1.423	0.155	-0.201
Hypertension	17	98.8 (107.0)	74.7 (55.6)	-24.1	-0.942	0.346	-0.161
Varicose veins of lower extremities	20	93.0 (99.2)	73.3 (54.5)	-19.7	-0.885	0.376	-0.140
Osteoarthritis	4	135.0 (79.4)	77.5 (69.5)	-57.5	-1.069	0.285	-0.378
Chronic neck pain	14	109.3 (126.0)	77.5 (57.5)	-31.8	-0.894	0.371	-0.169
Chronic low back pain	18	106.1 (70.9)	87.7 (63.2)	-18.4	-1.221	0.222	-0.203
Chronic allergy (excluding allergic asthma)	22	83.2 (61.4)	62.7 (46.7)	-20.5	-1.550	0.121	-0.233
Asthma (including allergic asthma)	25	84.8 (50.5)	58.6 (40.6)	-26.2	-2.225	0.026*	-0.314
Chronic bronchitis	5	174.0 (183.0)	72.0 (54.5)	-102	-1.603	0.109	**-0.507**
Diabetes type 2	3	60.0 (20.0)	33.3 (41.6)	-26.7	-1.341	0.180	**-0.547**
Cataracts	4	172.5 (205.5)	75.0 (30.0)	-97.5	-1.341	0.180	-0.474
Peptic ulcer disease	2	30.0 (42.4)	45.0 (21.2)	+15	-1.000	0.317	-0.500
Urinary incontinence or urine control problems	1	120.0 (-)	120.0 (-)	0.0	-	-	-
Hypercholesterolemia	25	109.2 (105.0)	70.2 (58.5)	-39.0	-2.538	0.011*	-0.359
Chronic skin disease	21	98.6 (107.3)	54.3 (53.7)	-44.3	-2.892	0.004**	-0.446
Chronic constipation	7	111.4 (51.1)	55.7 (47.2)	-55.7	-1.913	0.056	**-0.511**
Chronic migraine and other frequent chronic headaches	31	77.9 (96.3)	58.1 (41.8)	-19.8	-1.033	0.301	-0.131
Hemorrhoids	21	98.9 (90.8)	48.8 (46.7)	-50.1	-2.597	0.009**	-0.400
Cancer	2	90.0 (42.4)	60.0 (84.9)	-30.0	-1.000	0.317	**-0.500**
Osteoporosis	6	105.0 (59.2)	80.0 (62.0)	-25.0	-1.632	0.102	-0.471
Thyroid disease	12	72.5 (50.3)	70.8 (37.5)	-1.7	-0.060	0.952	-0.012
Renal disease	11	85.4 (45.0)	73.6 (76.1)	-11.8	-1.121	0.262	-0.239
Injury	8	45.1 (64.0)	67.5 (26.6)	+22.4	-1.207	0.227	-0.301

48. Values are Average (Standard Deviation: SD).

49. [a] P-values were based on Wilcoxon signed-rank test. * $P < 0.05$. ** $P < 0.01$. *** $P < 0.001$.

50. [b] $r = Z/\sqrt{N}$; $N=n*2$; Small 0.10, Medium 0.30, **Large 0.50.**

51. **Table 4.** Comparison of vigorous-intensity physical activity in minutes/day before and during COVID-19 quarantine (by each chronic condition)

Chronic condition	n	Before	During	Dif.	Z	P-value [a]	r [b]
Depression	23	35.0 (37.3)	32.6 (37.9)	-2.4	-0.411	0.681	-0.060
Anxiety	13	50.8 (33.3)	45.8 (32.5)	-5.0	-0.602	0.547	-0.118
Other psychiatric disorders	11	17.3 (30.1)	23.6 (24.1)	+6.3	-1.021	0.307	-0.217
Obesity	25	41.6 (58.2)	33.4 (33.2)	-8.2	-0.550	0.582	-0.077
Hypertension	17	35.0 (37.7)	30.6 (37.8)	-4.4	-1.131	0.258	-0.194
Varicose veins of lower extremities	20	31.5 (56.3)	15.3 (22.1)	-16.2	-1.642	0.100	-0.259
Osteoarthritis	4	67.5 (51.2)	37.5 (37.7)	-30	-1.341	0.180	-0.474
Chronic neck pain	14	41.8 (46.4)	40.4 (36.8)	-1.4	-0.118	0.905	-0.022
Chronic low back pain	18	61.1 (48.5)	51.4 (40.8)	-9.7	-1.025	0.305	-0.170
Chronic allergy (excluding allergic asthma)	22	42.7 (45.9)	30.9 (33.1)	-11.8	-1.055	0.291	-0.159
Asthma (including allergic asthma)	25	41.4 (42.3)	35.6 (38.1)	-5.8	-0.565	0.571	-0.080
Chronic bronchitis	5	60.0 (60.0)	50.0 (53.9)	-10.0	-0.447	0.655	-0.141
Diabetes type 2	3	40.0 (45.8)	36.7 (32.1)	-3.3	-0.447	0.655	-0.182
Cataracts	4	15.0 (30.0)	20.0 (28.3)	+5.0	-1.000	0.317	-0.353
Peptic ulcer disease	2	120.0 (169.7)	30.0 (42.4)	-90.0	-1.000	0.317	**-0.500**
Urinary incontinence or urine control problems	1	120.0 (-)	120.0 (-)	0.0	-	-	-
Hypercholesterolemia	25	46.8 (49.2)	48.6 (54.8)	+1.8	-0.095	0.924	-0.013
Chronic skin disease	21	32.9 (39.2)	27.9 (36.2)	-5.0	-0.438	0.661	-0.067
Chronic constipation	7	52.1 (41.6)	24.4 (26.4)	-27.7	-1.165	0.244	-0.311
Chronic migraine and other frequent chronic headaches	31	36.3 (42.0)	36.5 (39.5)	+0.2	-0.444	0.656	-0.056
Hemorrhoids	21	55.7 (63.1)	28.3 (31.3)	-27.4	-1.829	0.067	-0.282
Cancer	2	60.0 (84.9)	30.0 (42.4)	-30.0	-0.447	0.655	-0.223
Osteoporosis	6	80.0 (90.3)	35.0 (48.1)	-45.0	-1.603	0.109	-0.462
Thyroid disease	12	26.7 (51.9)	40.4 (43.3)	+13.7	-1.122	0.261	-0.229
Renal disease	11	46.4 (44.8)	20.9 (23.3)	-25.5	-1.572	0.116	-0.335
Injury	8	41.3 (53.0)	45.0 (40.1)	+3.7	-0.365	0.715	-0.091

52. Values are Average (Standard Deviation: SD).

53. [a] P-values were based on Wilcoxon signed-rank test. * $P < 0.05$. ** $P < 0.01$. *** $P < 0.001$.

54. [b] $r = Z/\sqrt{N}$; $N=n*2$; Small 0.10, Medium 0.30, **Large 0.50.**