

## Physical Activity and Sedentary Lifestyle among Pre-School Children during the Covid-19 Pandemic in São João Del-Rei

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### Abstract:

**Introduction:** *The containment measures of the new Corona virus can influence on children's behaviour.*

**Objective:** *Quantify and associate the referring data about physical activity and sedentary lifestyle among children on pre-school level during the period of social containment from COVID-19's pandemic.*

**Material and Methods:** *Observational analytical cross-sectional study. CAAE 42818421.0.0000.9667, ReBEC RBR-95wmpfn. Criteria for inclusion: aged between three and seven years old, both genders, on pre-school phase in São João del-Rei/MG. Criteria for exclusion: children with intellectual and/or multiple disability, and with doctor advice to not join physical activities. Administered a questionnaire to measure pre-school children's physical activity and sedentary behaviour (QAFS). Descriptive and statistical analyses and for Shapiro-Wilk and Chi-square tests by the tool JASP-Stata. The significant level was 5% ( $p < 0,05$ ).*

**Results:** *44 children mean age 6,2 ( $\pm 0,85$ ) years for females ( $n=31$ ) and mean age 6,1 ( $\pm 0,80$ ) years for males ( $n=13$ ). According to QAFS, about activity for more than 60 minutes, male gender shows increased incidence (38,4%) when compared to female gender (25,8%). About sedentary behaviour and inactivity for more than 60 minutes, female gender shows increased incidence (48,3%) when compared to male gender (46,1%). In the others variables different behaviours with the same time of activity and*

*inactivity between genders. Time\_playing1 (p=0.333) and Time\_playing2 (p=0.108), both variables are not associated with gender.*

**Conclusion:** *Male children appeared to be more physically active than the female ones, during the social containment period due to the COVID-19 pandemic.*

**Keywords:** Exercise. Sedentary Behaviour. COVID-19 Virus Infections. Physical Therapy modalities.

## 1. INTRODUCTION

In December 2019 a series of pneumonia cases were reported in China, and in February 2020 it was called the coronavirus 2019 disease (COVID-19), named thereby a Severe Acute Respiratory Syndrome related to coronavirus-2 (SARS-CoV-2)<sup>1</sup>. This virus is transmitted from person to person through respiratory droplets and contact, spreading rapidly all over the world, reason why in March 2020, the World Health Organization (WHO) defined the new coronavirus contamination as the global COVID-19 pandemic<sup>2</sup>.

COVID-19 has affected more than 210 countries and territories, more than 27 million of cases and 899 thousand of deaths<sup>3</sup>. In Brazil until middle November, the numbers indicated more than 21.989.962 confirmed cases and more than 612.144 deaths by the disease<sup>4</sup>, classifying the country as the second most affected in the world. In order to control the virus' spread, conventional control measures, including travel restriction, social distance and isolation of patients were embraced globally, which lead to sedentary behaviour and decrease physical activity<sup>5</sup>.

The regular practice of physical activity improves the cardio metabolic function, muscle health, cognitive function, immunity and acts decreasing depression and anxiety symptoms<sup>6</sup>. Therefore, in 2019 WHO released the global directions of physical activity, sedentary behaviour and sleep for children aged bellow five years old. However, analysing children who followed those directions, most of the countries presented lower results, the major result was Finland with 23%<sup>7</sup>

The practise of physical activity during childhood improves motor coordination<sup>8</sup>, mental and physical development, prevention of diseases and health in general. With this connection, WHO recommends that children aged between five and seventeen years practise the minimum of 60 minutes of moderate to vigorous physical activity daily<sup>9</sup>. Aligned with these data, studies point out that children have improved on insulin levels, body mass and cardiorespiratory system when practicing physical activity, but when it is suspended, the benefits are lost<sup>10</sup>.

Scientific evidence demonstrates that sufficient levels of physical activity, controlled time in front of screens and sleep quality are related with

child well-being, improving both emotional and physical development<sup>11</sup>. Worldwide, before COVID-19, those levels of physical activity on pre-school children were considered low<sup>9</sup> and given the measures to contain the virus' dissemination, tend to reduce even more, once that these children spend more time at home and because of that activities and playing time have limited space<sup>12</sup>.

That decreasing on the practise of physical activities leads to the adoption of sedentary behaviour, scored by the huge time spent in front of screens and seated, that contributes to the increased risk of many diseases, including the COVID-19<sup>13</sup>. In Brazil, diseases related to sedentary lifestyle kill 300.000 people annually and, in the entire world there are proximally 3,2 million of deaths annually due to this behaviour that is harmful both to health and to the population's quality of life<sup>14</sup>.

Due to the virus' contention measures, most of the establishment were closed. Hence, families needed to adapt rapidly to the social isolation, creating a big load of stress and anxiety<sup>12</sup>. These changes in humour can lead to binge eating, in which the food is seen as a way to relieve negative feelings<sup>15</sup>. Through these habit, associated with the decreasing of physical exercise and increasing of sedentary behaviour, obesity appears as a consequence, needing physical therapeutic care to enhance quality of life<sup>16</sup>.

The physical therapy works on the primordial prevention of health, area of collective health that aims the prevention of lifestyles, social standards, economic and cultural which can increase the risk of diseases<sup>17</sup>, such as obesity. Thus, physical therapy overcame the idea of only working in rehabilitation and can focus on the plural assistance model that is the Unified Health System (SUS) performing at the first level of care<sup>18</sup>.

Thereby, the development of healthy habits should begin at infancy so that it could be consolidated in adulthood. In this aspect, the conscience of the importance of physical activities and movement have better chances of being taken into the future<sup>8</sup>, minimizing the development of many diseases associated with sedentary lifestyle. With this in mind, it is up to the physical therapist work to re-establish the functions and improve people's quality of life<sup>16</sup>.

In that connection, this study aimed to quantify and associate the data referring to physical activity and sedentary lifestyle among pre-school aged children during the social contention due to COVID-19 pandemic.

## **2. MATERIAL AND METHODS**

This is a primary observational study, analytical, cross-sectional. The researchers and institutions followed with the terms presented on Resolution 466/2012 and Operational Norm n° 001/2013 of National Health Council,

watching over privacy and confidentiality of the obtained and used information of this study.

The participation on this study happened only after the clarification, guidance and the participation's and legal responsible' signature/agreement on The Written Informed Consent Form (WICF). The research was started after the approval of the Research and Ethics Committee of University Centre President Tancredo de Almeida Neves (UNIPTAN) through the appear number n° 4.557.320, CAAE n° 42818421.0.0000.9667 and registered in the Brazilian Registration of Clinical Trials (ReBEC) n° RBR-95wmphn.

The study was developed on the kinesiotherapy and practise of physio therapy course laboratory at UNIPTAN, being adopted as an inclusion criteria children aged between three and seven years, both genders, that was actively register on the pre-school level of the kindergarten in São João del-Rei, excluding children with any intellectual and/or multiple disability, and with doctor advise to not join physical activities. It was made disclosure on UNIPTAN's social media, e-mail sending to the educational institutions in the county of São João del-Rei, in order to reach children's families, once because of the current moment of pandemic, there are no in person classes and the social media have a huge reaching power.

The children's data registration questionnaire (QRDC) was developed by the researchers to register the children's sociodemographic information. It gathers the following data: age, gender, education institution, ethnicity, family income, weight, height, amount of people living in the house and the current health status.

The questionnaire to measure the physical activity and sedentary behaviour in pre-school children (QAFS) of Oliveira *et al.*,<sup>19</sup> has four questions referring to the time in which children spend playing outside and the time that this group spend in front of television. As a way to answer, parents point out the amount of minutes related to the days of the week (Monday to Friday) and weekend (Saturday and Sunday) and the periods of the day: morning, afternoon and night. The options of answer are: 0 minutes, 1-30 minutes, 31-60 minutes and > 61 minutes.

The answer variation of QAFS were categorized, according to Chart 1. The terms, just like the questionnaire, were available through the same link, sequentially, through Google Formularies platform, totalizing 29 questions. The questionnaire was available in May, Jun and July of 2021.

**Chart 1. Variable and their answer categories of QAFS**

	<b>Variables</b>	<b>Categorization</b>
<b>Time practising games and playing outside</b>	From the time wakes up to midday on Monday to Friday	Time_playing1
	From midday to six pm on Monday to Friday	Time_playing2
	From six pm to sleeping time on Monday to Friday	Time_playing3
	From the time wakes up to midday on Saturday to Sunday	Time_playing4
	From midday to six pm on Saturday to Sunday	Time_playing5
	From six pm to sleeping time on Saturday to Sunday	Time_playing6
<b>Time watching television</b>	From the time wakes up to midday on Monday to Friday	Time_seated1
	From midday to six pm on Monday to Friday	Time_seated2
	From six pm to sleeping time on Monday to Friday	Time_seated3
	From the time wakes up to midday on Saturday to Sunday	Time_seated4
	From midday to six pm on Saturday to Sunday	Time_seated5
	From six pm to sleeping time on Saturday to Sunday	Time_seated6

Source: authors' collection.

The values obtained were electronically tabled with the help of Excel 2013 (Microsoft Corporation, Redwood, WA, USA) program, and submitted for statistical analyses by the program *JASP-Stata* (Chicago, USA, versão 22.0). The significant level used as an acceptance or rejection criteria on the statistical tests was 5% ( $p < 0,05$ ). The test to verify the normal distribution of data (Shapiro-Wilk) and the test Chi-square to study the association between the variables were applied.

### 3. RESULTS

Participated on the study 44 children, mean aged 6,2 ( $\pm 0,85$ ) years for female gender ( $n=31$ ), and mean age 6,1 ( $\pm 0,80$ ) years for male gender ( $n=13$ ). Approximately 41% of children were part of families which the monthly income was up to two minimum salaries (R\$2.200,00). The average of people living in the same house for male children were 3 ( $\pm 0,66$ ) people, while for female were 4 ( $\pm 1,06$ ). The Body Mass Index (BMI) of male children showed higher average of (24,3 kg/m<sup>2</sup>), when compared to female (23,4 kg/m<sup>2</sup>). About the type of the school 38,6% ( $n=17$ ) were students from public schools and 61,4% ( $n=27$ ) were students from private schools.

On Table 1 are presented the measures obtained to the quantity variables.

**Table 1 – Measures of position and dispersion for quantity variables in study.  
São João del-Rei, 2021**

Gender	Variable	Minimum	Maximum	Mean	Standard Deviation	Coefficient of variation (%)	Median
Male	Age (years)	5	7	6	0,80	0,05	6
	Height (cm)	90	160	120	16,5	13,8	116
	Weight (kg)	17,0	33,0	24,3	5,4	22,2	25,0
Female	Age (years)	4	7	6	0,85	14,2	6
	Height (cm)	87	158	114	12,9	11,3	118
	Weight (kg)	16,0	34,0	23,4	4,9	20,9	23,0

Fonte: author's collection.

The distribution of absolute frequencies and percent for the variables gender, disease on the children and disease on the Family are presented on Table 2.

**Table 2 – Frequency of variables gender, disease on children and disease on Family. São João del-Rei, 2021.**

Gender	n <sub>i</sub>	100f <sub>i</sub> (%)	Disease on children	n <sub>i</sub>	100f <sub>i</sub> (%)	Disease on family	n <sub>i</sub>	100f <sub>i</sub> (%)
Male	13	29,6	Yes	3	6,8	Yes	23	52,2
Female	31	70,4	No	41	93,2	No	21	47,8

Legend: n: absolute frequency; f: relative frequency.

Source: authors' collection.

About the gender division,77,4% of female participants do not have diseases, 22,5% have asthma and/or bronchitis and there is no participant with hypertension. For male, 76,9% of participants do not have disease, 15,3% have asthma and/or bronchitis and 7,6% have hypertension.

About the diseases' occurrence on the family, for female children, 41,9% do not have diseases, 29% have hypertension, 12,9% have cardiac disease, 12,9% have diabetes and 3,2% have diabetes and hypertension related. For relatives of male children, 61,5% do not have diseases, 23% have hypertension, 7,6% have cardiac disease, 7,6% have diabetes and there are no relatives who have diabetes and hypertension related.

About children's perception on their health, for female gender, 35,4% consider their health as excellent, 32,2% as great, 32,2% as good. For male gender only 15,3% consider their health as excellent, 61,5% great and 23% as good. The same question was made to their parents, to classify their children's health.

Parents’ perception on their children’s health, for female gender, 41,9% consider as excellent, 25,8% as great and 32,2% as good. For the male gender, 30,7% consider as excellent, 61,5% as great and 7,6% as good. The analyses of QAFS answers, data showed that in activity for more than 60 minutes, on the variable Time\_playing1, male gender presented higher incidence (38,4%) comparing to female gender (25,8%). On the others variables, it was possible to notice different behaviours on the same time of activity (Time\_playing2: 53,8% male gender and 32,2% female gender; Time\_playing3: 15,3% male gender and 16,1% female gender; Time\_playing4: 38,4% male gender and 48,3% female gender; Time\_playing5: 61,5% male gender and 51,6% female gender; Time\_playing6: 23% male gender and 19,3% female gender).

About the sedentary behaviour watching television, data show that being inactive for more than 60 minutes, on the variable Tme\_seated1 female gender had higher incidence (48,3%) comparing to male gender (46,1%). On the others variables it was possible to notice different behaviours for the same inactive time between genders (Time\_seated2: 53,8% male gender and 35,4% female gender; Time\_seated3: 53,8% male gender and 58% female gender; Time\_seated4: 38,4% male gender and 32,2% female gender; Time\_seated5: 46,1% male gender and 35,4% female gender; Time\_seated6: 53,8% male gender and 61,2% female gender).

The associating between gender, time playing and time seated, was investigated by an independence Chi-square test presented on tables 3 and 4.

**Table 3. Time practising physical activity as games and playing outside**

Variables	Gender	0 min	1 a 30 min	31 a 60 min	> 61 min	p*
Time_playing1	Male	1	4	3	5	0.333
	Female	9	5	9	8	
Time_playing2	Male	1	3	2	7	0.452*
	Female	6	6	9	10	
Time_playing3	Male	4	4	3	2	0.812*
	Female	14	7	5	5	
Time_playing4	Male	2	5	1	5	0.516*
	Female	4	8	6	15	
Time_playing5	Male	0	4	1	8	0.566*
	Female	2	7	6	16	
Time_playing6	Male	3	4	3	3	0.560*
	Female	14	7	4	6	

\* p<0,05 for Chi-square tabled test.

**Table 4. Time spent watching TV and with sedentary behaviour during the week**

Variable	Gender	0 min	1 a 30 min	31 a 60 min	> 61 min	p*
Time_seated1	Male	0	3	4	6	0.407*
	Female	4	3	9	15	
Time_seated2	Male	0	5	1	7	0.108
	Female	6	6	8	11	
Time_seated3	Male	2	2	2	7	0.990*
	Female	4	4	5	18	
Time_seated4	Male	1	3	4	5	0.898*
	Female	5	7	9	10	
Time_seated5	Male	1	3	3	6	0.847*
	Female	4	6	10	11	
Time_seated6	Male	2	2	2	7	0.799*
	Female	4	2	6	19	

\* p<0,05 for Chi-square tabled test.

Only on Time\_playing1 ( $\chi^2(3) = 3.411$ ,  $p = 0.333$ ), the results point out that there was no association. The others variables are associated (Time\_playing2 ( $\chi^2(3) = 2.632$ ,  $p = 0.452$ ); Time\_playing3 ( $\chi^2(3) = 0.956$ ,  $p = 0.812$ ); Time\_playing4 ( $\chi^2(3) = 2.882$ ,  $p = 0.5160$ ); Time\_playing5 ( $\chi^2(3) = 2.033$ ,  $p = 0.566$ ); Time\_playing6 ( $\chi^2(3) = 2.060$ ,  $p = 0.560$ )).

In relation to time seated, only the variable Time\_seated2 ( $\chi^2(3) = 6.078$ ,  $p = 0.108$ ), didn't have association. The others are associated (Time\_seated1 ( $\chi^2(3) = 2.902$ ,  $p = 0.407$ ); Time\_seated3 ( $\chi^2(3) = 0.115$ ,  $p = 0.990$ ); Time\_seated4 ( $\chi^2(3) = 0.592$ ,  $p = 0.898$ ); Time\_seated5 ( $\chi^2(3) = 0.812$ ,  $p = 0,847$ ); Time\_seated6 ( $\chi^2(3) = 1.011$ ,  $p = 0.799$ )).

#### 4. DISCUSSION

It was observed that during the pandemic female children spend more time in front of screens than male, presenting sedentary behaviour. In a study developed by Tabacchi *et al.*,<sup>8</sup> no difference of sedentary time between genders were reported, however, results pointed out that the analysed children spent more than two hours a day watching videos and television.

About the time practising physical activity, for children aged from four to seven years old, male gender had more playing time. These data confront the studies of Zhang *et al.*,<sup>12</sup> that were observed, about children aged



from nine to fourteen years, that girls spend more time practicing physical activities.

The higher numbers of children playing and practising physical activity, were during weekends, in the afternoon. A possible explanation for that data is that on Saturday and Sunday there are no school classes and in this period most of parents and responsible are at home, allowing some family leisure moments playing games.

The amount of children that do not play in the afternoon, on week days, is high, less than a half. A reason for this event can be the school schedule, that for that group is in the afternoon. So, with the school closure and remote classes, the physical education classes and plays got affected.

The physical inactivity was observed in high numbers, eighteen children in the afternoon during the days of the week, and seventeen children at night on the weekend. These data meet the study developed by Nicodemo *et al.*,<sup>15</sup> that, although it was not analysed the physical activity during the periods of the day, point out that seven of the twenty-seven children aged between five and ten years, never practice physical activities at home.

Playing for more than 60 minutes were frequent for both genders. That data is in consonance with the study of Sá *et al.*,<sup>1</sup> that was observed that children aged until thirteen years, the majority, spend more than 60 minutes playing and being physically active.

In this study, girls have the highest level of sedentary behaviour, spending more time in front of screens. That data meets with the study of Dunton *et al.*,<sup>20</sup> in which shows that female children spend more time using electronic devices to leisure.

Besides the low level of physical activity, the participants' Body Mass Index had standards and average values. However, present risks of reaching overweight and obesity if the sedentary behaviour is maintained or increased. In a study developed by Santos *et al.*,<sup>21</sup> aiming analyse the infant abdominal circumference, data obtained shows that the prevalence of obesity between the interviewed children aged six years was 17%.

Most of the participants, 26 children of 44 analysed, do not attend WHO's recommendations for pre-school children, spending more than 60 minutes in front of screens. That data is in consonance with the study developed by Nyström *et al.*,<sup>7</sup> in which only 37,8% of interviewers follows the recommendations related to the sedentary lifestyle.

About the perception of children's health by a responsible, for female, gender 41,9% considered it as excellent and, for male gender, 61,5% considered it as great. These data confront the study of Alonso-Martínez *et al.*,<sup>22</sup> in which there were certain difficult to handle problems pointed out by parents, presenting complications on mental health.

Referring to the presence of diseases, 22,5% of female participants have asthmas and/or bronchitis, for male participants, this number is 15,3%, and 7,6% have hypertension. With this in mind, it is observed that participants already have complications that could be avoided through physical activities.

The average of people living in the house for female gender was four. That data meets the study of Aguilar-Farias *et al.*,<sup>23</sup> that had as a result the same number, showing that this gender has more companion and supervision during the lockdown.

Although, even that it was highlighted the data's associations referring to physical activity and sedentary lifestyle of pre-school children during the social contention due to COVID-19 pandemic, this study presented some limitations. Most of participants of this study studies on private schools, that can be explained by the fact that the research was developed online, that limited the accesses to millions of children from public schools. In this sense, the hypothesis for such an event may be due to the availability of internet access and electronic equipment to these children, since it has been reported in several Brazilian television news, great social disparities, resulting in high rates of social inequality in the education area in Brazil.

## 5. CONCLUSION

The COVID-19 pandemic caused changes in pre-school children's routine in the county of São João del-Rei. Besides that, it was observed that the gender is related to physical activity time and sedentary behaviour, in which male children showed to be more physically active than female gender. Thus, it is suggested that future studies be developed in order to clarify the behaviour in physical activity and sedentary lifestyle of children from public schools, and to develop efficient interventions to minimize the sedentary behaviour of this population in this region of Brazil.

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