Predispositions Factors Affecting Quality of Life in Children with T1DM During the Coronavirus Disease of 2019 Pandemic

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Abstract

Backgroud: Coronavirus disease 2019 (COVID-19) pandemic affects many aspects of society, including the quality of life (QoL) of children with type 1 diabetes mellitus (T1DM).This study analyzed predisposing factors that affect QoL of children with T1DM during the COVID-19 pandemic, mainly the socioeconomic factors.

Methods: Cross-sectional study was conducted in the Pediatric Endocrine Outpatient Clinicof Dr. Soetomo General Hospital, Indonesia, from March to October 2020. Childrens with T1DM were assessed using Pediatric Quality of Life Inventory 3.2 diabetes module. Socioeconomic characteristics were presented; correlation between variables were analyzed using Pearson and Spearman tests and $p< 0.05$ was statistically significant.

Conclusion: This study included 33 subjects (18 boys and 15 girls; mean age, 11.97 ± 2.91 years). Worry and treatment barrier for the child report correlated to the parent's educational background (r=0.35;p=0.022) and income (r=0.29;p=0.049). Worry, treatment barrier, and diabetes aspects for parents' report correlated to age group(r= −0.38;p=0.014), parents' educational background (r=0.37;p=0.015) and income (r=0.29;p=0.049). There's correlation between diabetes aspect of parent's report and age group (r= −0.38;p=0.014).

***Keywords**: children, COVID-19, HRQOL, type 1 diabetes mellitus*

Introduction

The World Health Organization Emergency Committee declared the coronavirus disease 2019 (COVID-19) pandemic as a global health emergency[1]. Its existence affects not only the health aspect but also the social and global economic aspects. In just 4 weeks, the lockdown conducted in New York cost an estimated $1.1 billion, which is 1% of the country's gross domestic product[2]. In Indonesia, the losses incurred during the first quarter of 2020 amounted to 320,000,000,000 rupiahs[3]. Separately, the occurrence of social restrictions, independent isolation, restrictions on long-distance travel, dismissal, and closed schools led to multidimensional crisis[2,4].

Type 1 diabetes mellitus (T1DM) is the most common chronic disease, with approximately 70.000 children diagnosed each year worldwide. The incidence was reported to be lower in Asia[5]. This century, the

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prevalence of diabetes mellitus worldwide is increasing[6]. In 2002–2014, there were 70 children with T1DM with 40% increment lately in 2020 in Surabaya, Indonesia[6]. As of August 2020, the Chinese Center for Disease Control and Prevention reported 2143 infections in children aged below 18 years[7]. Moreover, a report from the COVID-19 task force in Indonesia indicated that the infection rate in children is 11.4%, with 3.2% of deaths. This mortality rate is relatively the highest compared with other countries[8].

A multidisciplinary approach was very important in children with T1DM. Previous studies have reported that individuals with low socioeconomic status (SES) tend to have inadequate treatment; thus, they are at risk to develop complications[9–11]. Alfian et al.stated that patient's low compliance may result in a lower QoL[12]. In addition, the International Society for Pediatric and Adolescent Diabetes (ISPAD) guidelines said that depression and anxiety affect patients with T1DM, resulting in bad glycemic control.

Parent education, parent income, and parent employment may influence the QoL of patients with T1DM, mainly because of the COVID-19 pandemic[10,11]. The reduced capacity for contact with physicians owing to fear of going to the hospital may lead to a further decrease in QoL of patients with T1DM in pandemic conditions[13]. This study aimed to analyze factors that affect the quality of life (QoL) of children with T1DM during the COVID-19 pandemic; the components assessed were diabetes, treatment barrier, treatment adherence, worry, and communication.

Material and Methods

Sample

This study involved children and adolescents diagnosed as having T1DM according to the ISPAD guidelines registered at the Pediatric Endocrinology Outpatient Clinic of Dr. Soetomo General Hospital, Surabaya, Indonesia,and their parents. The inclusion criteria were patients aged 5–18 years, who were diagnosed as having T1DM, and who already started their treatment. A total of 33 patients aged between 5 and 18 years (18 boys and 15 girls) were included in this study.

Socioeconomic factor

Socioeconomic factors such as parents' education, parents' income, child's age, and children's education were obtained. The educational background was classified based on the government program of 9-year compulsory education; hence, we divided it into 3 groups: <9 years, 9–12 years, and >12 years. Based on the regional minimum wage, we classified SESinto 3 groups: low, medium, and high. The ages of children were then grouped into 5–7 years, 8–12 years, and 13–18 years.

Nutritional status

Nutritional status was classified according to the World Health Organization (body mass index for age) values defined for children and adolescents (5–18 years old): severe malnutrition ($z < -3$), moderate malnutrition ($-3 < z < -2$), normal ($-2 < z \leq 1$), overweight ($1 < z < 2$), and obesity ($z > 2$). We grouped the subjects into severe malnutrition, moderate malnutrition, normal, and overweight or obese.

Pediatric Quality of Life Inventory (PedsQL)

The patient's QoLwas assessed using the PedsQL 3.2 diabetes module by Varni et al. for children based on the patient's age[14]. The PedsQL questionnaire that was used to assess the QoLof the children with T1DM has been translated into Bahasa Indonesia by a credible sworn translator. It assessed the aspects of diabetes, which assessed the diabetes symptoms (15 items); treatment barriers, which evaluated the obstacles or problems during treatment (treatment I) (5 items); treatment adherence (treatment II) (6 items); worry (3 items); and communication (4 items) with the items reverse scored. A 5-point scale (0 [never], 1 [almost never], 2 [sometimes], 3 [often], and 4 [almost always]) and a 3-point scale (0 [not at all], 2 [sometimes], and 4 [a lot]) were used for the Child Report for Young Children (ages 5–7 years).

These scores were transformed to a 0–100 scale: 0 = 100, 1 = 75, 2 = 50, and 4 = 0. Lower scores indicate more diabetes symptoms and management problems. In a study by Varni et al., the validity and reliability were tested in this PedsQL, showing good results[15]. Validity is assessed based on predicting the morbidity and disease burden of the patient and his parents. Reliability indicates consistent results from several repetitions of the test[14].Moreover, the validity and reliability of the PedsQL questionnaire have been tested by the Statistics of Universitas Airlangga. The questionnaire was shared online to the participants by the same team during the study.

Evaluation of data

A comparison test was used to analyze our data using the SPSS 17.0 software (IBM SPSS). For the baseline and clinical characteristics, the mean and standard deviation of each element were used. Normality test was done for each data using the Shapiro-Wilk test because the study sample was >50, the correlation test was done using the Pearson test for parametric data and the Spearman test for nonparametric data, and the chi-square contingency was used for the nominal data to test their correlation. We considered $p< 0.05$ as statistically significant.

Ethical permission

This study's ethical approval was granted by the ethics committee overseeing health research teamat the Dr. Soetomo GeneralHospital, Surabaya, Indonesia(ref. no:0123/LOE/301.4.2/IX/2020).

Results and Discussion

This cross-sectional study involved 33 children with T1DM (18 boys and 15 girls; age, 11.97 ± 2.91 years). The socioeconomic characteristics of the patients with T1DM are presented in Table 1. Most of them have a good nutritional status (90.9%) and are active in teaching and learning activities. Most of the parents' income was in the group of middle income (54.5%). The parent's educational background was mostly 9–12 years (63.6%).

Table 1. Baseline characteristics of the patients with T1DM

Characteristics	N (%)
Age (years)	
5–7 years old	3 (9)
8–12 years old	17 (51.5)
13–18 years old	13 (39.9)
Gender	
Boys	18 (54.5)
Girls	15 (45.5)
Nutritional status	
Severe malnutrition	1 (3)
Moderate Malnutrition	1 (3)
Normal	30 (90.9)
Overweight or obese	1 (3)
Socioeconomic status	
Low	26 (78.8)
Medium	5 (15.2)
High	2 (6.1)
Parents's Educational Background	
<9 years	3 (9.1)
9–12 years	21 (63.6)
>12 years	9 (27.3)

The average data of each aspect on the QoL assessment results of children and parents are presented in Fig. 1. The best value was obtained in the adherence treatment, whereas the worst was the worry score.

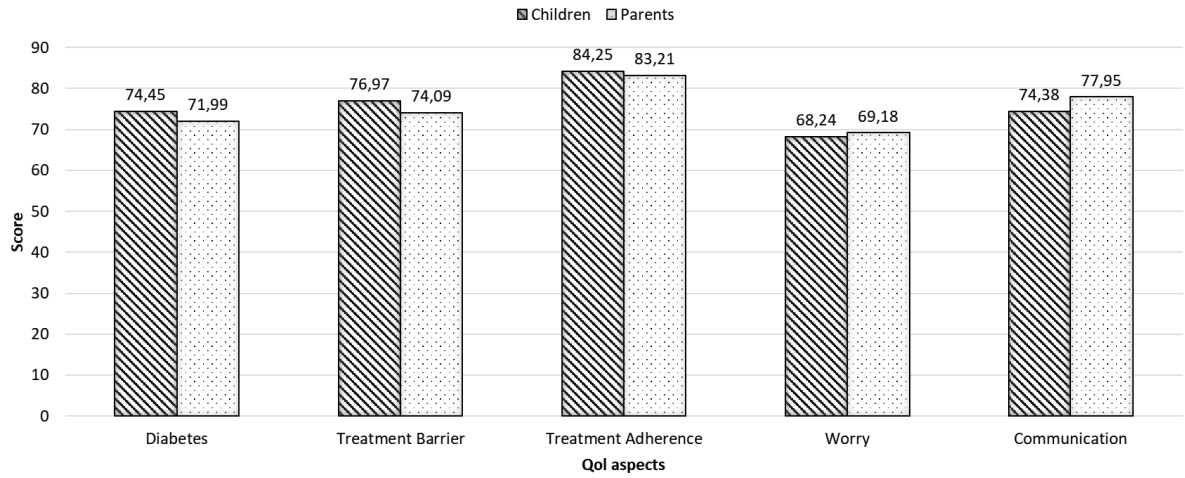

Fig 1. Means of each aspect's QoL results in children and parents.

The results of the correlation between socioeconomic factors and QoL are presented in Tables 2 and 3. The correlation test revealed significant results in parent's education with child's worry (r = 0.35;*p* = 0.022)and parent's worry (r = 0.37;*p* = 0.015). Moreover, the age group had a significant value on the diabetes score of the parents (r = −0.38;*p* = 0.014). Parent's income significantly correlated to the treatment barrier (r = 0.29;*p* = 0.049).

Table 2. Correlation study between children QoL and socioeconomic factors

Socioeconomic factors	Correlation coefficient (p-value)					
	Diabetes	**Treatment barrier**	**Treatment adherence**	**Worry**	**Communication**	**Mean**
Child's education	(r = −0.16; p = 0.183)	(r = −0.12; p = 0.251)	(r = 0.03; p = 0.424)	(r = −0.22; p = 0.103)	(r = 0.05; p = 0.393)	(r = −0.10; p = 0.287)
Age group	(r = −0.22; p = 0.108)	(r = −0.01; p = 0.475)	(r = 0.04; p = 0.409)	(r = −0.18; p = 0.149)	(r = −0.02; p = 0.466)	(r = −0.13; p = 0.222)
Parent's education	(r = 0.11; p = 0.256)	(r = 0.09; p = 0.293)	(r = 0.19; p = 0.142)	(r = 0.35; p = 0.022*)	(r = 0.15; p = 0.207)	(r = 0.25; p = 0.080)
Parent's income	(r = 0.18; p = 0.152)	(r = 0.29; p = 0.049*)	(r = 0.05; p = 0.385)	(r = 0.14; p = 0.217)	(r = 0.09; p = 0.304)	(r = 0.22; p = 0.115)

*$p < 0.05$

Table 3. Correlation study between parents' QoL and socioeconomic factors

Socioeconomic	Correlation coefficient (p value)					
	Diabetes	Treatment barrier	Treatment adherence	Worry	Communication	Mean
Child education	(r = −0.13; p = 0.235)	(r = −0.11; p = 0.272)	(r = −0.05; p = 0.388)	(r = −0.10; p = 0.282)	(r = 0.12; p = 0.237)	(r = −0.10; p = 0.287)
Age group	(r = −0.38; p = 0.014*)	(r = −0.15; p = 0.206)	(r = −0.06; p = 0.373)	(r = −0.19; p = 0.142)	(r = 0.05; p = 0.378)	(r = −0.13; p = 0.222)
Parent education	(r = 0.06; p = 0.360)	(r = −0.12; p = 0.251)	(r = 0.27; p = 0.067)	(r = 0.37; p = 0.015*)	(r = 0.06; p = 0.368)	(r = 0.25; p = 0.080)
Parent income	(r = 0.28; p = 0.054)	(r = 0.25; p = 0.075)	(r = 0.06; p = 0.374)	(r = 0.16; p = 0.176)	(r = 0.23; p = 0.099)	(r = 0.21; p = 0.115)

*p< 0.05

Our study findings from the constituent components of SES indicated that parent education significantly correlates to the worry aspect of QoL in both parent and child. This finding is consistent with the findings of Costa and Vieira, who reported that parental education correlated with QoL, especially in the worry's domain[11]. In particular, it was reported that patients who have parents with higher education backgrounds will have better QoL and lower levels of anxiety and depression than those who have parents with lower educational backgrounds.[16]

This study also found that parental income significantly correlates to treatment barriers. This finding consistent with the study of Costa and Vieira, who reported that parent's income has a role in better QoL results in the satisfaction component and worries, which was also linked to happiness, which can then play a role in better compliance and self-management[11,17]. T1DM is a disease that is closely related to the environment and lifestyle, in which lifestyle and environment are related to the SES of a family, which consists of parents' education, parents' income, and parents' occupation[18,19]. Other studies also reported that QoL was better in males than females[20,21].

Another finding indicated that older children with T1DM had a lower QoL, especially in the diabetes aspect. This can happen because when children are getting older, they have more personal opinions, and it becomes more difficult to control their treatment[22,23]. This finding is also consistent with that of Abdul-Rasoul's study, which showed that the 13–18 age group had the lowest QoL compared with the younger age group[10].

In this study, most of the subjects aged 8–12 years (51.5%), were male (54.5%), and had normal nutritional status (90.9%). This study is consistent with that of Abdul-Rasoul et al., who reported that most of the age group is 8–12 years[10,24].

Nevertheless, there is a limitation in this study. It was conducted at a referral hospital in East Indonesia, where the number of T1DM cases was lower than in Caucasians. Moreover, because of limited resources, the

management of T1DM is quite complicated in Indonesia. Besides maintaining routine control in the Pediatric Endocrine Outpatient Clinic, some factors, such as the socioeconomic and educational background of parents, can affect QoL.

We could not conclude whether there is any different T1DM QoL before and during the pandemic. There are no studies that evaluated factors affecting QoL during the COVID-19 pandemic. To the best of our knowledge, this is the first study on children with T1DM that evaluated the determining factors that affect QoL during the COVID-19 pandemic.

Conclusion

This study included 33 subjects (18 boys and 15 girls; mean age, 11.97 ± 2.91 years). Worry and treatment barrier for the child report correlated to the parent's educational background (r = 0.35; $p = 0.022$) and income (r = 0.29; $p = 0.049$). Worry, treatment barrier, and diabetes aspects for parents' report correlated to age group (r = −0.38; $p = 0.014$), parents' educational background (r = 0.37; $p = 0.015$) and income (r = 0.29; $p = 0.049$). There's correlation between diabetes aspect of parent's report and age group (r = −0.38; $p = 0.014$).

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