

# Effect of Mental Health Problems on the Quality of Life in Children with Lupus Nephritis

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Azwin Mengindra Putera <sup>1</sup>  
Irwanto Irwanto <sup>1</sup>  
Margarita Maria Maramis <sup>2</sup>  
Risky Vitria Prasetyo <sup>1</sup>  
Ninik Asmaningsih Soemyarso <sup>1</sup>  
Mohammad Sjaifullah Noer <sup>1</sup>

<sup>1</sup>Department of Child Health, Faculty of Medicine, Universitas Airlangga - Dr. Soetomo General Academic Hospital, Surabaya, Indonesia; <sup>2</sup>Department of Psychiatry, Faculty of Medicine, Universitas Airlangga - Dr. Soetomo General Academic Hospital, Surabaya, Indonesia

**Introduction:** Mental health problems, such as anxiety, depression, and ineffective family coping, in children with lupus nephritis (LN) can increase the severity and affect the management of the disease, thus affecting the quality of life (QoL) of patients.

**Objective:** Analyzing the association between levels of depression, anxiety, coping, disease activity on the QoL of pediatric patients with LN.

**Patients and Methods:** There were 62 pediatric LN participants (16 participants in the induction phase and 46 participants in the maintenance phase). Participants were measured for anxiety, depression, coping, disease activity (systemic lupus erythematosus disease activity index/SLEDAI), and QoL. The measurement results were compared between induction and maintenance groups. Analysis of the association between anxiety, depression, coping, and disease activity with the QoL of children with LN used a multiple logistic regression test with  $p < 0.05$ .

**Results:** The measurement results obtained anxiety (induction =  $69.06 \pm 3.92$  and maintenance =  $45.24 \pm 10.33$ ;  $p < 0.001$ ), depression (induction =  $69.88 \pm 3.34$  and maintenance =  $42.20 \pm 9.12$ ;  $p < 0.001$ ), coping (induction =  $99.88 \pm 12.93$  and maintenance =  $115.67 \pm 7.34$ ;  $p < 0.001$ ), SLEDAI (induction =  $15.81 \pm 12.58$  and maintenance =  $0.43 \pm 1.26$ ;  $p < 0.001$ ), and QoL (induction =  $49.92 \pm 12.44$  and maintenance =  $88.15 \pm 8.06$ ;  $p < 0.001$ ). Anxiety level in the induction group ( $p = 0.043$ ) and maintenance group ( $p < 0.001$ ;  $p = 0.032$ ;  $p = 0.008$ ;  $p = 0.009$ ). Depression level in the induction group ( $p = 0.031$ ) and maintenance group ( $p = 0.024$ ;  $p = 0.042$ ;  $p = 0.003$ ). SLEDAI score in the maintenance group ( $p = 0.003$ ;  $p = 0.003$ ). Coping in induction group ( $p = 0.016$ ;  $p = 0.016$ ) and maintenance group ( $p = 0.005$ ).

**Conclusion:** Mental health disorders reduce the QoL of LN children, and the level of QoL in induction phase is lower than maintenance phase.

**Keywords:** anxiety, depression, disease activity, coping, quality of life, lupus nephritis

## Introduction

Lupus nephritis (LN) is a chronic disease that requires a long-term management.<sup>1,2</sup> The disease can cause depression and anxiety disorders that will prolong treatment and increase the disease severity.<sup>3</sup> These conditions impact the disease management and life quality of LN patients.<sup>2,4,5</sup> Treatment of children with LN has increased rapidly by increasing the life span of LN patients, but LN patients have limitations in daily activities, resulting in a new problem, namely, mental health problem.<sup>3,6,7</sup>

Children with LN need effective coping to adjust their lives.<sup>5</sup> Similar to the course of other chronic diseases, LN patients are one of the groups who are at risk of experiencing mental health problems. Depression and anxiety disorders in children in the world are increasing, and the prevalence of depression in chronic

Correspondence: Azwin Mengindra Putera  
Department of Child Health, Faculty of Medicine, Universitas Airlangga - Dr. Soetomo General Academic Hospital, Jl. Mayjen Prof. Dr. Moestopo No. 6-8, Airlangga, Gubeng, Surabaya, East Java 60286, Indonesia  
Tel +6231-5501218  
Email azwinmengindraputera@gmail.com

diseases is significantly higher than in the general population.<sup>3,8</sup> LN symptoms have episodic nature, which is characterized by remission and flare phases. However, to present the degree of activity at a time in LN disease, there are no clinical or laboratory manifestations that are singly represented.<sup>6,9</sup> In addition, the patient's quality of life (QoL) is decreasing.<sup>10</sup>

Thus far, there are no studies reporting the influences of depressive disorders and/or anxiety disorders or coping on the life quality of LN children. Therefore, it is necessary to perform screening for psychosocial disorders, both depression and anxiety and coping mechanisms, for the situation. However, screening to evaluate health-related life quality in LN children is rare, especially in long-term management, so children with poor psychological quality, such as depression, anxiety, and coping, from caregivers are not identified. However, the evaluation results can identify those who are at risk of poor health-related life quality so as to improve the treatment of lupus patients based on the needs of each individual.<sup>2</sup>

Dr. Soetomo General Academic Hospital, Surabaya, Indonesia is one of the largest hospitals in East Java, Indonesia. The number of pediatric patients with LN in 2018 was 162 patients, and there were new patients reported each month from January to April 2019. The researchers were interested in examining the effect of levels of depression, anxiety, coping, disease activity on the life quality pediatric patients with LN in order to improve and develop the management of pediatric patients with LN.

## Patients and Methods

### Participants

Participants in this study should meet the inclusion and exclusion criteria. The inclusion criteria included patients diagnosed with LN,<sup>11,12</sup> aged 6–18 years, were in the induction or maintenance phase. The induction phase consisted of a new patient diagnosed with LN for up to 6 months. The patient received intravenous methylprednisolone pulse for 3 days at a dose of 30 mg/kg/day (maximum 1 gram). On the fourth day, the patient received cyclophosphamide (CPA) intravenous pulse 500–1000 mg/m<sup>2</sup> once and together with oral prednisone at a dose of 0.5–1.0 mg/kg/weight body/day (maximum 30 mg) every day. The treatment was given for 6 months, then followed by the administration of methylprednisolone pulse intravenous. CPA pulse was only given once every month after methylprednisolone pulse. Intravenous CPA

pulse could be replaced with oral mycophenolate mofetil (MMF), but there were differences in the administration procedure and dose usage. Oral MMF was given together with methylprednisolone pulse at a dose of 600 mg/m<sup>2</sup>/dose every 12 hours (15–23 mg/kg/dose; maximum dose of 1 gram/12 hours) for up to 6 months. The maintenance phase was at 6 months after the patient diagnosed with LN. The patient received steroid and then decreasing the dose of oral prednisone to the lowest dose, but still maintained the remission condition and should not be stopped. If combined with MMF, oral MMF was slowly reduced to the lowest dose which retained the remission dose, and should not be stopped. If using a combination with CPA, post-CPA induction pulse was given every 3 months for 24 months (a total treatment period of 30 months) and then stopped.<sup>12</sup> Participant exclusion criteria included children experiencing mental retardation, cerebral palsy, participant fever/temperature >37.5°C, high leukocyte levels, and parents unwilling to take part in research. Participants have received an explanation of the participant's goals, benefits, rights and obligations during the study.

### Design

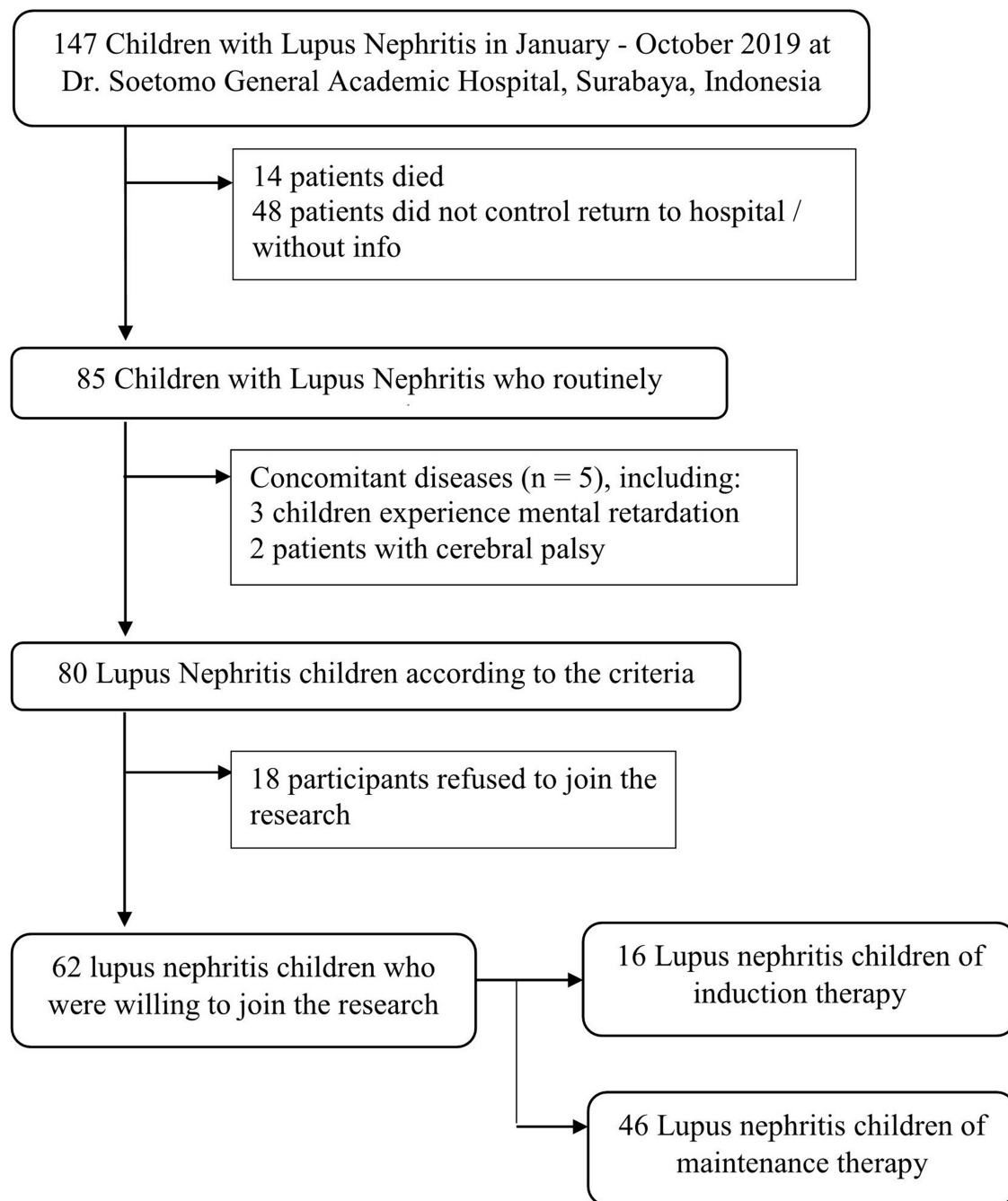
This study used a cross-sectional design carried out at the Children's Nephrology and Inpatient Poly Department of Child Health, Dr. Soetomo General Academic Hospital, Surabaya, Indonesia. Our hospital is a teaching hospital with the main reference to health problems for eastern Indonesia. The study was conducted from January to October 2019 with 62 participants, which were divided into 2 groups (16 participants in induction group and 46 participants in maintenance group; [Figure 1](#)). Participants were measured for characteristics, levels of depression, anxiety, family coping, disease prognosis, and QoL.

### Depression and Anxiety Measurement

Participant's depression and anxiety were assessed using the Revised Child Anxiety and Depression Scale (RCADS) questionnaire with 25 question items to determine a child's anxiety and/or depression disorder. A total score of 70 or more indicates that children may have experienced clinically significant anxiety/depression symptoms.<sup>13</sup> RCADS is a valid and reliable tool (Cronbach's alpha = 0.75 to 0.95).<sup>14</sup>

### Family Coping Measurement

Family coping was measured using family crisis-oriented personal evaluation scales (F-COPES) questionnaire based on 5-point Likert's scale. This instrument has 30 items of



**Figure 1** Sampling process in Children with Lupus Nephritis.

coping behavior designed to record problem solving, attitudes and behaviors that families develop to respond to problems or difficulties. The five subscales designed in the F-COPES include acquiring social support, reframing, seeking spiritual support, mobilizing family to acquire and accept help, and passive appraisal.<sup>15,16</sup> The higher the score, the better the problem solving and behavioral responses found during difficult situations. F-COPES was declared valid and reliable with Cronbach's alpha = 0.89.<sup>16</sup>

## Disease Activity Measurement

LN disease activity was measured using the Indonesian version of systemic lupus erythematosus disease activity index (SLEDAI). There are 24 items, with each item has its own score. Mild or moderate SLEDAI score shows a change in SLEDAI >3 points, while severe SLEDAI score shows a change in SLEDAI score >12.<sup>17</sup> SLEDAI was declared valid and reliable to describe the disease activity of LN patients with a Cronbach's alpha value of 0.87 (95% CI; 0.72–0.95).<sup>18</sup>

## Quality of Life Measurement

QoL was assessed using the Pediatric Quality of Life Inventory-Rheumatology Module (PedsQL-RM) according to the age subgroup. There are 22 questions, which are divided into 5 subscales: pain and hurt, daily activities, treatment, worry, and communication. The total score of  $\geq 70$  indicates good QoL.<sup>19</sup> The PedsQL-RM is declared valid and reliable with a Cronbach's alpha value of 0.75–0.86 in children and 0.82–0.91 in adults.<sup>19</sup>

## Statistical Analysis

The results of measurement were analyzed using IBM SPSS Statistics software version 23.0 (IBM Corp., Armonk, NY, USA). The statistical test used a multiple logistic regression test to obtain the results of depression, anxiety, and family coping disorders on QoL, both in the induction phase and in the maintenance phase. Independent *t*-test or Mann Withney was conducted to obtain the results of depression disorders, anxiety disorders, and family coping between the induction and maintenance phases, also the results of the QoL both in the induction and maintenance phases. Statistical tests were significant if  $p < 0.05$ .

## Results

### Characteristics of Participant

This study examined 62 participants, which were divided into induction group (16 children) and maintenance group (46 children). Most children in the induction and maintenance phase aged  $\geq 12$  years (68.75% and 84.79%, respectively). The average participant's age in the induction and maintenance phase were  $13.25 \pm 2.72$  years and  $13.91 \pm 2.49$  years, respectively. Most participants were women, both in the induction and maintenance phase (62.50% and 67.39%, respectively). Most participants were junior high school students in both groups (induction group = 43.75% and maintenance group = 45.65%; Tables 1 and 2).

Most participants in the induction group experienced anxiety (56.25%), while participants in the maintenance group were not entirely anxious. Half of the entire participants in the induction group were depressed, while there are no participants in the maintenance group felt depressed. This study only found participants in the induction group who were depressed and anxious (75.00%). Participants in the induction group mostly had severe disease activity

**Table 1** Distribution of Participant's Characteristics

Characteristics	Induction Phase (n=16)	Maintenance Phase (n=46)
Age (%)		
<12 years	5 (31.25)	7 (15.21)
$\geq 12$ years	11 (68.75)	39 (84.79)
Sex (%)		
Male	6 (37.50)	15 (32.61)
Female	10 (62.50)	31 (67.39)
Education (%)		
Elementary School	4 (25.00)	10 (21.74)
Junior School	7 (43.75)	21 (45.65)
Senior High School	5 (31.25)	15 (32.61)
Anxiety (%)		
No	7 (43.75)	46 (100.00)
Yes	9 (56.25)	0 (0.00)
Depression (%)		
No	8 (50.00)	46 (100.00)
Yes	8 (50.00)	0 (0.00)
Anxiety and Depression (%)		
No	4 (25.00)	46 (100.00)
Yes	12 (75.00)	0 (0.00)
SLEDAI (%)		
Normal	1 (6.25)	41 (89.13)
Mild/moderate	6 (37.50)	5 (10.87)
Severe	9 (56.25)	0 (0.00)
QoL (%)		
<70	16 (100.00)	1 (2.17)
$\geq 70$	0 (0.00)	45 (97.83)
Subscale QoL, pain and hurt (%)		
<70	13 (81.25)	1 (2.17)
$\geq 70$	3 (18.75)	45 (97.83)
Subscale QoL, daily activities (%)		
<70	2 (12.50)	0 (0.00)
$\geq 70$	14 (87.50)	46 (100.00)
Subscale QoL, treatment (%)		
<70	15 (93.75)	2 (4.35)
$\geq 70$	1 (6.25)	44 (95.65)
Subscale QoL, worry (%)		
<70	16 (100.00)	18 (39.13)
$\geq 70$	0 (0.00)	28 (60.87)
Subscale QoL, communication (%)		
<70	15 (93.75)	22 (47.83)
$\geq 70$	1 (6.25)	24 (52.17)

**Abbreviation:** QoL, quality of life.

**Table 2** Comparison of Quality of Life Scores, Anxiety, Depression, SLEDAI, and Coping Between Induction and Maintenance Phases

Characteristics	Induction Phase (n=16)	Maintenance Phase (n=46)	p
Age	13.25 ± 2.72	13.91 ± 2.49	–
Anxiety	69.06 ± 3.92	45.24 ± 10.33	0.000**
Depression	69.88 ± 3.34	42.20 ± 9.12	0.000**
Anxiety and depression	71.75 ± 3.42	43.15 ± 10.38	–
SLEDAI	15.81 ± 12.58	0.43 ± 1.26	0.000**
Coping	99.88 ± 12.93	115.67 ± 7.34	0.000**
Coping of acquiring social support	29.75 ± 5.71	36.23 ± 3.00	0.000**
Coping of reframing	33.00 ± 4.95	34.78 ± 4.08	0.275
Coping of seeking spiritual support	16.68 ± 3.42	18.41 ± 1.63	0.027*
Coping of family mobility	11.75 ± 4.68	16.52 ± 2.08	0.000**
Coping of passive appraisal	8.68 ± 3.18	10.11 ± 2.49	0.119
QoL	49.92 ± 12.44	88.15 ± 8.06	0.000**
QoL subscale of pain and hurt	46.48 ± 25.20	92.12 ± 8.68	0.000**
QoL subscale of daily activities	86.25 ± 25.40	98.18 ± 4.37	0.007*
QoL subscale of treatment	47.32 ± 18.60	89.20 ± 10.80	0.000**
QoL subscale of worry	26.56 ± 23.21	76.92 ± 18.58	0.000**
QoL subscale of communication	23.95 ± 15.48	74.77 ± 24.76	0.000**

**Abbreviations:** QoL, quality of life; \*significant <0.05; \*\*significant <0.001

(SLEDAI) score (56.25%), while most participants in the maintenance group had normal score (89.13%; [Table 1](#)). The results of the participant's coping measurements in the induction and maintenance group were 99.88±12.93 and 115.67±7.34, respectively. Coping measurements included social support (induction = 29.75±5.71 and maintenance = 36.23±3.00), reframing (induction = 33.00±4.95 and maintenance = 34.78±4.08), spiritual support (induction = 16.68 ±3.42 and maintenance = 18.41±1.63), family mobilization (induction = 11.75±4.68 and maintenance = 16.52±2.08), and passive appraisal (induction = 8.68±3.18 and maintenance = 10.11±2.49; [Table 2](#)).

The average of QoL score in the induction groups with not good category (<70) was 49.92±12.44. Meanwhile, most maintenance group with good category (≥70) had a QoL average of 88.15±8.06. QoL measurement included pain and hurt (induction with not good category was 81.25%; maintenance with good category was 97.83%), daily activities (induction with good category was 87.50%; maintenance with good category was 100%), treatment (induction with not good category was 93.75%; maintenance with good category was 95.65%), worry (induction with not good category was 100.00%; maintenance with good category was 60.87%), and communication (induction with not good category was 93.75%; maintenance with good category was 52.17%; [Tables 1 and 2](#)).

## Effects of Anxiety, Depression, SLEDAI and Coping on Quality of Life in the Induction and Maintenance Phase

This study found a significant correlation between anxiety and communication domain of QoL in the induction group ( $\beta = 0.514$ ;  $p = 0.043$ ). Meanwhile, there was no significant association between anxiety and other domains of QoL in the induction group. In the maintenance group, there was a significant association between anxiety and QoL ( $\beta = -0.583$ ;  $p < 0.001$ ), pain and hurt domain ( $\beta = -0.344$ ;  $p = 0.032$ ), worry domain ( $\beta = -0.691$ ;  $p = 0.008$ ), and communication domain ( $\beta = -0.381$ ;  $p = 0.009$ ). There was no significant association between anxiety and daily activities ( $\beta = 0.326$ ;  $p = 0.098$ ), as well as treatment ( $\beta = -0.169$ ;  $p = 0.356$ ; [Table 3](#)).

There was a significant association between depression and communication domain in the induction group ( $\beta = -0.551$ ;  $p = 0.031$ ). Meanwhile, there was no significant association between depression and other domains of QoL. In the maintenance, group there were some significant associations between depression and pain and hurt domain ( $\beta = -0.364$ ;  $p = 0.024$ ), daily activities ( $\beta = -0.405$ ;  $p = 0.042$ ), and treatment ( $\beta = -0.428$ ;  $p = 0.003$ ). There was no significant association between anxiety and depression with the participant's QoL in the maintenance group ([Table 3](#)).

There was no significant association between disease activity (SLEDAI) and participant's QoL in the induction

**Table 3** Correlation Between Anxiety, Depression, Disease Activity and Quality of Life of Children with Lupus Nephritis in the Induction and Maintenance Groups

	Induction (n=16)				Maintenance (n=46)			
	Anxiety	Depression	Anxiety and Depression	SLEDAI	Anxiety	Depression	Anxiety and Depression	SLEDAI
QoL	0.466	0.171	–	–	0.000**	0.150	0.883	0.003*
Pain and hurt	0.693	0.175	0.733	0.950	0.032*	0.024*	0.883	0.003*
Daily activities	0.734	0.374	0.417	0.452	0.098	0.042*	–	–
Treatment	0.216	0.606	0.082	0.609	0.356	0.003*	0.834	0.072
Worry	0.472	0.430	–	–	0.008*	0.411	0.429	0.967
Communication	0.043*	0.031*	0.582	0.252	0.009*	0.831	0.301	0.574

**Abbreviations:** QoL, quality of life; \*significant <0.05; \*\*significant <0.001

group. On the other hand, this study found a significant association between disease activity (SLEDAI) and QoL ( $\beta = 0.883$ ;  $p = 0.003$ ) and pain and hurt domain ( $\beta = 0.883$ ;  $p = 0.003$ ; Table 3) in the maintenance group.

In general, this study found no significant association between coping and QoL both, in overall coping and coping domain. In addition, there was a significant association between reframing domain and daily activities in the induction group ( $\beta = 0.591$ ;  $p = 0.016$ ). The group also had a significant association between family mobilization domain and daily activities ( $\beta = 0.591$ ;  $p = 0.016$ ). There were two significant associations found in the maintenance group, which were between social support domain and communication domain ( $\beta = -0.406$ ;  $p = 0.005$ ) and between family mobilization and treatment ( $\beta = 0.313$ ;  $p = 0.034$ ; Table 4).

### Comparison of Quality of Life, Anxiety, Depression, SLEDAI, and Coping Scores Between Induction Phase and Maintenance Phase

The results showed a significant difference score between induction and maintenance groups ( $p < 0.001$ ). There were some insignificant differences, including reframing domain ( $33.00 \pm 4.95$  vs  $34.78 \pm 4.08$ ;  $p = 0.275$ ) and passive appraisal domain ( $8.68 \pm 3.18$  vs  $10.11 \pm 2.49$ ;  $p = 0.119$ ). In addition, there was a significant difference between induction and maintenance group with  $p > 0.001$ . The differences were in terms of seeking spiritual support ( $16.68 \pm 3.42$  vs  $18.41 \pm 1.63$ ;  $p = 0.027$ ) and daily activities ( $86.25 \pm 25.40$  vs  $98.18 \pm 4.37$ ;  $p = 0.007$ ; Table 2).

### Discussion

LN can cause psychosocial comorbidity, where anxiety and depression are the most manifestations.<sup>4,20</sup> In the

induction phase, increasing anxiety increases QoL's subscale of communication due to feelings of confusion in the family as a result of unclear conditions of the disease, treatment success, conflict with medical management, social isolation, limitations due to various regulations, increased financial burden<sup>21</sup> that raises anxiety.<sup>22</sup> Various psychological burdens cause families to feel unable to cope with their child's health problems, thus giving rise to an increase in information seeking and over-use medical services.<sup>23,24</sup> Families will look for parties deemed capable of providing assistance by communicating to obtain a variety of good information from extended families, people who have experience caring for children with the same disease, also foundations/social institutions.<sup>24,25</sup> In the induction phase, increased depression decreases the QoL's subscale of communication. Depression in severe illnesses causes difficulties in communicating, both by children and caregivers, to health workers, and arises feeling of less satisfied with medical care,<sup>24</sup> because depression affects a person's ability to understand information and communicate effectively, has a low sense of trust in interacting with health workers about child's illness,<sup>26</sup> and withdrawal from social environment. This interpersonal behavior causes pessimistic views and negative attitudes towards management, thus consequently reducing the outcome of disease management.<sup>27</sup>

In the induction phase, the increasing coping's subscale of reframing will increase the QoL's subscale of daily activities. In this study, the increasing coping's subscale of spiritual support improved the QoL's subscale of daily activities. The people who have good QoL's, thereby reducing psychological stress and decreasing interleukin-6, immune dysregulation and other inflammatory markers.<sup>28</sup> The comfort of religious and spiritual beliefs makes them

**Table 4** Correlation Between Coping and Quality of Life of Children with Lupus Nephritis in the Induction and Maintenance Groups

	Induction (n=16)					Maintenance (n=46)						
	Coping	Social Support	Reframing	Spiritual Support	Family Mobilization	Passive Appraisal	Coping	Social Support	Reframing	Spiritual Support	Family Mobilization	Passive Appraisal
QoL	-	-	-	-	-	-	0.752	0.110	0.849	0.255	0.088	0.448
Pain and hurt	0.202	0.159	0.384	0.730	0.192	0.324	0.752	0.110	0.849	0.255	0.088	0.448
Daily activities	0.375	0.735	0.016*	0.016*	0.818	0.190	-	-	-	-	-	-
Treatment	0.361	0.116	0.222	0.334	0.087	0.132	0.950	0.719	0.187	0.235	0.834	0.425
Worry	-	-	-	-	-	-	0.781	0.388	0.377	0.075	0.429	0.724
Communication	0.404	0.898	0.222	0.627	0.194	0.471	0.279	0.005*	0.531	0.214	0.301	0.179

Abbreviations: QoL, quality of life; \*significant <0.05; \*\*significant <0.001

more satisfied with their lives, happier, and decreases pain, thereby increasing daily activities in children with chronic illness.<sup>24,28,29</sup>

In the maintenance phase, an increase in anxiety decreases overall QoL and the QoL's subscale of pain and hurt. Despite being well-controlled disease, health-related QoL in children with lupus remains below the normal population, and this can be caused by anxiety,<sup>30</sup> which affects the immune system through increased cytokines, inflammation and pain.<sup>31</sup> In the maintenance phase, increased anxiety decreases the QoL's subscale of worry. Chronic medical illness is a risk factor for psychiatric disorders including anxiety. Anxiety often arises in daily activities,<sup>8</sup> and is very influential in caregivers of chronic disease children, especially regarding the long-term prognosis of their children causing various limitation activities,<sup>32</sup> especially in caregivers for children with autoimmune due to worrying about their future.<sup>32,33</sup> Increased anxiety in the maintenance phase also reduces the QoL's subscale of communication. Long-term management and recurrence in lupus disease cause anxiety even though disease activity is controlled.<sup>34</sup> As there is no clear cure, conflicts often arise with various medical treatments, feeling of isolation, and additional financial burden.<sup>21</sup> The inability to manage anxiety will reduce one's ability to communicate effectively,<sup>35</sup> which is very important for quality health care and to improve patient outcomes.<sup>36</sup>

In the maintenance phase, increased depression decreases the QoL's subscale pain and hurt as well as daily activities. In lupus patients, increased depression causes increased disease activity,<sup>37</sup> likely due to neurotransmitter dysfunction and immune system activation as a result of abnormalities in lymphocytes and cytokine expression,<sup>38,39</sup> which cause more severe clinical manifestations<sup>38,40</sup> and increasing aches and wounds/pain<sup>39,40</sup> that result in disruption of daily activities which decreases the QoL of lupus patients.<sup>38</sup> In the maintenance, increased depression decreases the QoL's subscale of treatment. There is a strong association between depression and medication adherence, where patients reporting noncompliance tend to have a longer duration of disease than those reporting medication adherence, even after controlled disease activity.<sup>41,42</sup> Depression can delay patients to control and not obey treatment because it depends on others, thus leading to poor disease prognosis.<sup>43</sup>

Increased lupus activity in the maintenance phase increased overall QoL and the QoL's subscale of pain and hurt. When parents first find out the child is suffering from a chronic illness, the patient and family are trying to find

a cure by taking treatment. This is the initial stage of perception and emotional response that is called a problem-focused strategy. However, after a long treatment and feeling of hopeless to change the situation, the patient and family finally get used to this condition after feeling resigned, accepting reality and destiny as a form of response from the reorganization of grieving and getting a picture of the cause of problem, so that they gradually adjust to the circumstances experienced. This is the next stage of perception and emotional response that is called emotional-focused.<sup>44</sup> There is a turning-to-religion mechanism, in which the patient and family get convinced that this condition is a trial from God that must be lived.<sup>44,45</sup> Accepting this reality/resignation is inseparable from social support and gratitude for God's gift in accordance with culture and religiosity in Indonesia,<sup>46,47</sup> which contributes significantly to the QoL of patients with chronic illness, raises positive support, facilitates increased resilience to moods or emotional control,<sup>47,48</sup> thereby increasing QoL and decreasing patient's pain.<sup>28</sup>

Increased coping's subscale of social support in the maintenance phase reduced the QoL's subscale of communication. Social support was initially relatable, but along with the duration of treatment in chronic diseases, it arises difficulties in meeting the needs of children due to increased complex problems that cause parents to feel isolated but do not want to re-access social support because of the stigma they associate with the disease and various related problems.<sup>34</sup> Increased coping's subscale of family mobilization in the maintenance phase increased the QoL's subscale of treatment. Managing chronic diseases is very demanding for patients, such as the obligation to take medication according to schedule, special diets, limited activities, regular independent monitoring, regular visits to health services, responsive to changes in symptoms and test results. These burdens cause patients to need support for the management of their disease because they sometimes could not meet the needs that affect the treatment outcome and have an impact on their QoL. Due to the large gap between the need for self-care support and available resources, family members are increasingly recognized as important allies in the care of patients with chronic pain.<sup>49</sup> Family or other party support to help patients solve health problems is divided into emotional and financial support. The family as the patient's closest environment is a source of individual knowledge and perception of health, and supports to improve the QoL in the treatment of patients.<sup>49,50</sup>

This study found a comparison of QoL in induction phase and maintenance phase of LN children, both in the total QoL and each subscale of QoL. This indicated a lower QoL in the induction phase compared to the maintenance phase. High disease activity and complications give a bad impact on the QoL of lupus children. In the induction phase, there are various kinds of intensive treatment with a tight schedule, frequent visits from various health workers accompanied by various laboratory tests will have a negative impact on QoL. However, patients with low disease activity will have better physical function that indicates an improved QoL.<sup>10</sup>

There was a significant comparison between anxiety and depression in induction phase and maintenance phase. This indicated that many subjects in the induction phase suffered from depression or anxiety compared to the maintenance phase. Mental disorders physically have been shown to be associated with pain due to inflammation in lupus patients. Biological mechanisms of autoantibodies and proinflammatory cytokines can cause mental disorders in lupus patients.<sup>9</sup> In lupus, there are remission (non-active) and flare (active) conditions with various symptoms such as proteinuria, rash, arthritis. During flare condition, frustration can arise that have a negative impact on adult lupus, namely loss of ability to work, decreased income, and limitations in social activities that can cause emotional disorders such as depression and anxiety. It can be assumed that emotional disturbances are related to disease activity in lupus patients.<sup>51</sup> In addition, long-term treatment, especially in the induction phase where visits and even hospitalizations are required in a tight schedule, dependence on immunosuppressants and other supporting drugs, as well as drug side effects decrease activity in both adult and pediatric lupus patients, resulting in a decrease in their ability to reach their life goals and make them feel abnormal and depressed.<sup>52</sup>

This study obtained significant results in the comparison between disease activity in induction phase and maintenance phase, where the SLEDAI score in the induction phase was higher than the SLEDAI score in the maintenance phase. The management of the induction phase aims to control the disease activity by inducing remission of disease flares, because at this point there is a potential to threaten organs and/or lives that need to be treated aggressively. Whereas the target of management in the maintenance phase is to avoid recurrence and control disease activity by limiting inflammation and damage.<sup>11</sup> The SLEDAI score of LN children in Poland was higher in the induction phase compared to the maintenance phase.<sup>6</sup>



Total coping scores and subscales of acquiring social support, seeking spiritual support and family mobilization in the induction phase were significantly lower than in the maintenance phase. LN in children can cause psychological disorders if the child or parents are unable to adjust to this situation,<sup>7,53</sup> and cause various reactions in their daily lives.<sup>54,55</sup> When LN diagnosis was first established, intensive and aggressive treatment can cause traumatic event for parents and children that leads to various psychological reactions<sup>53,55</sup> because the treatment changes the lifestyle of the family.<sup>53</sup> Stressors in the early phase of children with critical conditions are often caused by the lack of information at the time about the illness, the uncertainty of medical status and recovery of children, as well as changes in their personal role as parents.<sup>54,56</sup> There is a dynamic process, namely emotional control (emotion-focused coping) and problem-focused coping management, along with the disease course,<sup>54</sup> that results in the evolution of stress and coping/adaptation that minimizes fluctuations in the management of the disease course,<sup>53–55</sup> through seeking social support,<sup>54,55</sup> analyzing problem-solving; use more positive judgment; controlling emotions; prevent escape from reality; to be responsible; and accept destiny.<sup>54,57</sup>

Limitations of this study need to be added to other control groups, such as healthy individuals, patients with depression/anxiety or lupus patient without nephritis, may be useful in painting a more complete picture.

## Conclusion

Children with LN require a long treatment process due to a chronic disease process, which puts patients at risk of experiencing mental health problems. It is necessary to evaluate the association of mental health problems with the QoL of LN children. The management of LN is divided into two stages, namely induction phase and maintenance phase. LN patients were measured for depression, anxiety, family coping, disease activity and QoL. Mental health disorders reduce the QoL in children with LN, where the level of QoL of the induction phase is lower than in the maintenance phase. Mental health disorders are important to be analyzed to maximize treatment in children with LN.

## Ethical Approval

All procedures performed in studies involving human participants were in accordance with the Declaration of Helsinki at Ethical Committee in Health Research Dr. Soetomo General Academic Hospital, Surabaya, Indonesia (Ethical number 1188/KEPK/V/2019).

## Informed Consent

Participants have received an explanation regarding the following research. The patient's personal data will be kept confidential. Participants who were willing to take part in the research filled out the consent form provided. A parent or legal guardian of participant provided written informed consent and research questionnaire.

## Disclosure

The authors declare that they have no conflict of interest.

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