Effects of Social Support, Functional Status, and Depression on the Quality of Life of Stroke Patients: A Meta-Analysis

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ABSTRACT

Background: Stroke patients have physical, social, and psychological disorders. It inhibits their daily activities, thus affecting the quality of life. This study aimed to analyze the effect of social support, functional status, and depression on the quality of life of stroke patients.

Subjects and Method: This study was a meta-analysis study. The data were obtained from Clinical Key, DOAJ, PubMed, Science Direct, Proquest, Scopus, and Google Scholar. The keywords were "social support" AND "functional status" AND "depression" AND "quality of life "AND" stroke". The articles were published from January 1991 to September 2020. The articles studied were full-text articles with a cross-sectional and cohort study design. The articles were collected using the PRISMA diagram and analyzed using the RevMan 5.3 program.

Results: This study obtained 12 articles consisted of 2,015 selected stroke patients. The result of the meta-analysis showed that social support had a significant positive effect on the quality of life of stroke patients (b= 0.03; 95% CI= 0.02 to 0.05; p= 0.0001), functional status had a significant positive effect on the quality of life of stroke patients (b= 0.63; 95% CI= 0.52 to 1.08; p=0.0001), and depression had a significant negative effect on the quality of life of stroke patients (b= -0.18; 95%CI= -0.26 to -0.10; p=0.0001).

Conclusion: Social support and functional status improve the quality of life of stroke patients. Depression reduces the quality of life of stroke patients.

Keywords: social support, functional status, depression, quality of life, stroke

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BACKGROUND

Stroke is a major health problem which is increasing each year. Stroke is the second leading cause of death in the world after ischemic heart disease (Setiawan et al., 2018; Zhu, 2019). Global Burden of Disease (GBD) reported that there were more than 9.5 million new cases of ischemic stroke in 2016, more than 2.7 million deaths occurred due to ischemic strokes, and almost 60% occurred under 70 years of age (Patel et al., 2019). In 2017, there were 11.9 million incidents of stroke, a prevalence of 104.2 million, 6.2 million were fatal, and 132.1 million had disabilities due to stroke. The incidence of stroke, prevalence, mortality, and disability decreased from 1990 to 2017, but the number of people who had...
Several factors determined the quality of life of stroke patients were comorbidity, family support, functional status, morale, age, duration of illness, and depression (Elmawla et al., 2019; Fan et al., 2020).

Stoke caused about a third of sufferers to have long-term physical, cognitive, psychological, and social disorders (Pedersen et al., 2019). Pratiwi et al., (2019) found that cognitive disorder was a risk factor for depression in stroke patients.

Stoke caused various changes such as physical, social, and psychological changes. Physical changes were characterized by disability on one side of the body and inability to walk and do daily activities (Pei et al., 2016). Social changes in stroke patients were caused by the inability to communicate characterized by difficulties in speaking and language. Psychological changes were characterized by depression, anxiety, fatigue, sleep disorder, difficulty adapting, and lack of motivation in treatment (Terrill et al., 2018). These conditions decreased quality of life in stroke patients (Canuto et al., 2016).

Stoke patients had a decrease in quality of life, especially in psychological aspects, spiritual well-being, and tend to have depression (Bender et al., 2016). Depression occurred due to stroke had a negative effect on the quality of life in stroke patients (Batool et al., 2017; Hammed and Ugboh, 2018). Functional status affected the quality of life of stroke patients. According to Chaleoykitti et al., (2020), low functional status greatly affected the quality of life of stroke patients. Social support is important for rehabilitation and reintegration into the community (Lima et al., 2019). In addition, stroke patients also need intensive health care to improve their quality of life (Pandit, 2020).

This study used a systematic review for studies relevant to the meta-analysis. This study aimed to analyze the effect of social support, functional status, and depression on the quality of life of stroke patients.

### SUBJECTS AND METHOD

1. **Study Design**
   This study was a meta-analysis study. The main observation in this study was to analyze the effect of social support, functional status, and depression on the quality of life of stroke patients.

2. **Data search strategy**
   The data were searched from a systematic and comprehensive database of several indexes such as Clinical Key, DOAJ, PubMed, Science Direct, Proquest, Scopus, and Google Scholar. The keywords were "social support" AND "functional status" AND "depression" AND "quality of life" AND "stroke".

3. **Population and Sample**
   The population of this study was post-stroke patients, both ischemic and hemorrhagic.

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**Eligibility Criteria**

The eligibility criteria used PICO (population, intervention, comparison, outcome).

<table>
<thead>
<tr>
<th>Social support</th>
<th>Functional status</th>
<th>Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>P Patients after stroke</td>
<td>Patients after stroke</td>
<td>Patients after stroke</td>
</tr>
<tr>
<td>I Strong social support</td>
<td>Good functional status</td>
<td>Major depression</td>
</tr>
<tr>
<td>C Weak social support</td>
<td>Poor functional status</td>
<td>Minor depression</td>
</tr>
<tr>
<td>O Quality of life</td>
<td>Quality of life</td>
<td>Quality of life</td>
</tr>
</tbody>
</table>
Inclusion Criteria
The study subjects were stroke patients aged ≥ 18 years, full-text articles published in English, articles with observational studies (cross-sectional and cohort study design). In addition, the statistical results reported were the results of multivariate analysis (β-coefficient) and the quality of life assessments used a valid scale.

Exclusion criteria
Stroke patients aged ≤ 18 years, articles with RCT study designs, quasi-experimental, case-control and protocol studies, non-English articles, duplicated articles, non-multivariate analysis (β-coefficient), and quality of life assessments used an invalid scale.

4. Study Variables
The independent variables were social support, functional status, and depression. The dependent variable was quality of life.

5. Operational Definition of Variables
Stroke was a clinical syndrome caused by a focal and global brain disorder with symptoms lasting 24 hours or more. Stroke was diagnosed through physical and radiological check-up (MRI/CT scan).

Social support was support or assistance that came from family, relatives, friends, and organizations. Social support used a continuous scale with the categories of weak and strong social support.

Functional status was the ability to do self-care activities independently. Functional status was measured using a continuous scale with the categories of low and high functional status.

Depression was a mood disorder characterized by feelings of deep sadness and ignorance. Depression was measured using a continuous scale with the categories of minor and major depression.

Quality of life was an individual's perception of his/her life position in the context of culture and value systems where individuals lived. It was related to goals, expectations, and problems. The quality of life used the SF-36, QLI, EUROQoL-5D-3L, SSQoL, SIS 3.0, and SIS-16 scales.

6. Statistical analysis
The data were analyzed using the Review Manager (Rev-Men) 5.3 program to calculate the adjusted Odds Ratio (aOR/β-coefficient) that were adjusted as a whole (Karlinda et al., 2019).

RESULTS
Selection from study
The total number of articles collected was 2,558 articles. After reviewing and evaluating each article from each related website, there were 12 articles with a total sample of 2,015 stroke patients consisting of 2 articles on social support (Choi-Kwon et al., 2016) and (Perry dan McLaren, 2004), 5 articles on functional status (Chaleoykitti et al., 2020), (Chen et al., 2015), (Gunaydin et al., 2011), (Gurcay et al., 2009), (Khalid et al., 2016), and 6 articles on depression (Adey-Wakeling et al., 2016), (Minshall et al., 2020), (Chen et al., 2015), (Cumming et al., 2014), (Perry and McLaren, 2004b), (Wulsin et al., 2012).

The characteristics of the study
The number of the sample included in the inclusion criteria was 2,015 post-stroke patients. The articles came from UK, South Korea, Australia, China, USA, Thailand, Taiwan, Turkey, and Pakistan.

1. Social support
Table 1 shows that there were 2 articles of the study on the effect of social support on the quality of life of stroke patients using the cohort study design.
Table 1. The summary of source articles of the effect of social support on quality of life of stroke patients.

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Age</th>
<th>Country</th>
<th>Study design</th>
<th>Total sample</th>
<th>Follow-up duration</th>
<th>Stroke, Social support, quality of life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choi-Kwon et al., (2016)</td>
<td>≥ 60 years</td>
<td>South Korea</td>
<td>Cohort</td>
<td>135</td>
<td>12 months after stroke</td>
<td>Stroke: MRI. Social support: The ENRICHD Social Support Instrument Quality of life: SF-36</td>
</tr>
<tr>
<td>Perry dan McLaren, (2004)</td>
<td>≥ 65 years</td>
<td>UK</td>
<td>Cohort</td>
<td>196</td>
<td>6 months after stroke</td>
<td>Stroke: clinical check-up. Social support; The Medical Outcomes Study Social Support Scale Quality of life: Quality of Life Index</td>
</tr>
</tbody>
</table>
a. Forest plot
Figure 2 shows the forest plot of the effect of social support on the quality of life of stroke patients. The heterogeneity of the test results was \( p = 0.22; \ I^2 = 34\% \), thus using the fixed-effect model (FEM). The result of the data analysis on the forest plot showed that social support had a significant positive effect on the quality of life of stroke patients (\( \beta \)-coefficient = 0.03; 95% CI= 0.02 - 0.05; \( p = 0.0001 \)). Therefore, strong social support improved the quality of life of stroke patients.

Figure 2. The forest plot of the meta-analysis of the effect of social support on the quality of life of stroke patients

b. Funnel plot
Figure 3 shows the funnel plot of the effect of social support on the quality of life of stroke patients. Since the articles combined were only 2 articles, the publication bias on the effect of social support on quality of life could not be concluded.

Figure 3. The funnel plot of the meta-analysis of the effect of social support on the quality of life of stroke patients

2. Functional status
Table 2 shows that there were 5 articles regarding the effect of functional status on the quality of life of stroke patients using a cross-sectional study design.
Table 2. The summary of source articles of the effect of functional status on quality of life of stroke patients.

<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Age (Years)</th>
<th>Country</th>
<th>Study design</th>
<th>Total sample</th>
<th>The criteria of stroke, functional status, quality of life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaleoykitti et al., (2020)</td>
<td>≥ 60</td>
<td>Thailand</td>
<td>Cross-sectional</td>
<td>113</td>
<td>Stroke; brain imaging&lt;br&gt;- Status fungsional; BI (Barthel Index)&lt;br&gt;- Quality of life; WHOQOL-BREF&lt;br&gt;- Stroke; brain imaging&lt;br&gt;- Functional status; FIM&lt;br&gt;- Quality of life; SIS (stroke impact scale) 3.0</td>
</tr>
<tr>
<td>Chen et al., (2015)</td>
<td>30-80</td>
<td>Taiwan</td>
<td>Cross-sectional</td>
<td>119</td>
<td>Stroke; brain imaging&lt;br&gt;- Functional status; FIM&lt;br&gt;- Quality of life; SIS 3.0</td>
</tr>
<tr>
<td>Gunaydin et al., (2011)</td>
<td>≥ 18</td>
<td>Turkey</td>
<td>Cross-sectional</td>
<td>80</td>
<td>Stroke; MRI&lt;br&gt;- Functional status; FIM&lt;br&gt;- Quality of life; SSQOL</td>
</tr>
<tr>
<td>Gurcay et al., (2009)</td>
<td>33-80</td>
<td>Turkey</td>
<td>Cross-sectional</td>
<td>67</td>
<td>Stroke; CT scan/MRI&lt;br&gt;- Functional status; FIM&lt;br&gt;- Quality of life; SIS 3.0</td>
</tr>
<tr>
<td>Khalid et al., (2016)</td>
<td>≥ 18</td>
<td>Pakistan</td>
<td>Cross-sectional</td>
<td>241</td>
<td>Stroke; CT scan/MRI&lt;br&gt;- Functional status; FIM&lt;br&gt;- Quality of life; SSQOL</td>
</tr>
</tbody>
</table>

a. Forest plot

Figure 4 shows the forest plot of the effect of functional status on the quality of life of stroke patients. The heterogeneity of the test results was (p= 0.00001; I²= 93%), thus using a random-effect model (REM). The results of data analysis on the forest plot showed that functional status had a significant positive effect on the quality of life of stroke patients (β-coefficient = 0.63; 95% CI= 0.36 to 0.89; p= 0.0001). Therefore, good functional status improved the quality of life of stroke patients.
b. Funnel plot
Figure 5 shows the funnel plot of the effect of functional status on the quality of life of stroke patients. The funnel plot figure showed that the distribution of the study was symmetrical. The distribution of plot points was balanced between the right and left sides of the centerline border. Therefore, there was no publication bias on the effect of functional status on the quality of life of stroke patients.

Figure 5. The funnel plot of the effect of functional status on quality of life of stroke patients

3. Depression
Table 3 shows that there were 6 articles regarding the effect of depression on the quality of life of stroke patients using a cohort study design.

Table 3. The summary of source articles of the effect of depression on quality of life of stroke patients.

<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Age</th>
<th>Country</th>
<th>Study design</th>
<th>Total Subjects</th>
<th>Follow-up duration</th>
<th>Stroke, Depression, quality of life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adey-Wakeling et al.,</td>
<td>34 – 85 years</td>
<td>Australia</td>
<td>Prospective</td>
<td>263</td>
<td>12 months after stroke</td>
<td>Stroke; radiology Depression: Geriatric Depression Scale Quality of life; EuroQoL-5D 3L</td>
</tr>
<tr>
<td>(2016)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minshall et al.,</td>
<td>≥ 65 years</td>
<td>Australia</td>
<td>Cohort</td>
<td>72</td>
<td>33 months after stroke</td>
<td>Stroke; check-up Depression; hospital anxiety &amp; depression scale Quality of life; AQOL-6D Stroke; MRI</td>
</tr>
<tr>
<td>(2020)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chen et al., (2015)</td>
<td>40-80 years</td>
<td>China</td>
<td>Cohort</td>
<td>218</td>
<td>3 months after stroke</td>
<td>Depression; hospital depression rating scale Quality of life; stroke specific quality of life Stroke; medical record Depression; hospital &amp; anxiety depression scale Quality of life; AQOL Stroke; clinical check-up Depression; hospital anxiety &amp; depression scale Quality of life; Quality of Life Index Stroke; medical record Depression; Center for Epidemiological Studies Depression Scale Quality of life; Stroke Specific Quality of Life</td>
</tr>
<tr>
<td>Cumming et al., (2014)</td>
<td>≥ 18 years</td>
<td>Australia</td>
<td>Cohort</td>
<td>60</td>
<td>3 months after stroke</td>
<td></td>
</tr>
<tr>
<td>Perry dan McLaren (2004)</td>
<td>≥ 65 years</td>
<td>UK</td>
<td>Cohort</td>
<td>196</td>
<td>6 months after stroke</td>
<td></td>
</tr>
<tr>
<td>Wulsin et al., (2012)</td>
<td>25-93 years</td>
<td>USA</td>
<td>Cohort</td>
<td>322</td>
<td>3 months after stroke</td>
<td></td>
</tr>
</tbody>
</table>
a. Forest plot

Figure 6 shows the forest plot of the effect of depression on the quality of life of stroke patients. The heterogeneity of the test results was ($p = 0.00001; I^2 = 94\%$), thus using a random-effect model (REM). The results of the data analysis showed that depression had a significant negative effect on the quality of life of stroke patients ($\beta$-coefficient$ = -0.18; 95\% \text{ CI} = -0.26 \text{ to } -0.10; p = 0.00001$). Therefore, major depression reduced the quality of life of stroke patients.

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Beta coefficient</th>
<th>SE</th>
<th>Weight</th>
<th>IV, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adley-wakeing2016</td>
<td>-0.037</td>
<td>0.211</td>
<td>26%</td>
<td>-0.04 [-0.49, 0.42]</td>
</tr>
<tr>
<td>Chen 2015</td>
<td>-1</td>
<td>0.2143</td>
<td>30%</td>
<td>-1.00 [-1.42, -0.58]</td>
</tr>
<tr>
<td>Cuming 2014</td>
<td>-0.017</td>
<td>0.0092</td>
<td>33.3%</td>
<td>-0.02 [-0.04, 0.00]</td>
</tr>
<tr>
<td>Minshall 2020</td>
<td>-0.04</td>
<td>0.0051</td>
<td>33.7%</td>
<td>-0.04 [-0.05, -0.03]</td>
</tr>
<tr>
<td>Perry 2004</td>
<td>-0.479</td>
<td>0.0638</td>
<td>17.8%</td>
<td>-0.48 [-0.60, -0.35]</td>
</tr>
<tr>
<td>Wusin 2012</td>
<td>-0.46</td>
<td>0.1071</td>
<td>9.5%</td>
<td>-0.46 [-0.57, -0.25]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td></td>
<td></td>
<td></td>
<td>-0.18 [-0.26, -0.10]</td>
</tr>
</tbody>
</table>

Heterogeneity: $\tau^2 = 0.00; \chi^2 = 98.82, df = 5 (P < 0.00001); I^2 = 94\%$
Test for overall effect: $Z = 4.60 (P < 0.00001)$

Figure 6. The forest plot of the effect of depression on the quality of life of stroke patients

a. Funnel plot

Figure 7 shows the funnel plot of the effect of depression on the quality of life of stroke patients. The funnel plot showed that the distribution of the study was symmetrical. The distribution of plot points was balanced between the left and right sides of the centerline border. Therefore, there was no publication bias on the effect of depression on the quality of life of stroke patients.
DISCUSSION

The meta-analysis study included the result of the multivariate analysis only to control the confounding factor.

1. **The effect of social support on the quality of life of stroke patients**

The result of a meta-analysis of the effect of social support on the quality of life of stroke patients showed that strong social support improved the quality of life of stroke patients by 0.03 times compared to weak social support. A study conducted by Butsing et al. (2019) stated that social support in the form of emotional, information, and financial supports affected the quality of life of stroke patients. Besides, a study conducted by Alshahrani (2020) stated that social support from family and other people affected the quality of life of stroke patients.

2. **The effect of functional status on the quality of life of stroke patients**

The result of a meta-analysis of the effect of functional status on the quality of life of stroke patients stated that good functional status improved the quality of life of stroke patients by 0.63 times compared to poor functional status. A study conducted by Abubakar and Isezuo (2012) stated that the factor affecting the quality of life of stroke patients was functional status. Functional status was a factor that determined the quality of life of stroke patients (Gunaydin et al., 2011). A study conducted by Chaleoykitti et al., (2020) found that functional status affected the quality of life of stroke patients.

3. **The effect of depression on the quality of life of stroke patients**

The results of a meta-analysis of the effect of depression on the quality of life of stroke patients stated that major depression reduced the quality of life of stroke patients by 0.18 times compared to minor depression. A study conducted by Abubakar and Isezuo (2012) stated that depression was one of the factors affecting the quality of life of stroke patients. Symptoms of depression in acute stage were very important in predicting quality of life in 2 months after stroke. Depressed stroke patients would hinder all domains of quality of life (Zikic et al., 2014).

Stroke patients who had a reduced quality of life due to physical, social, and psychological disorders needed rehabilitation and appropriate interventions for post-stroke recovery. Strong social support and good functional status could be used to improve the quality of life of stroke patients. Therefore, it is very important to identify patients at risk through depression screening because depression could reduce the quality of life of stroke patients.

There were several limitations to this study. 12 articles met the criteria where this study only focused on observational studies (cross-sectional and cohort studies). Besides, it was only multivariate analysis. Paid articles to get full-text articles were also a limitation in this study. In addition, this study used English language articles only due to the limitations of the author, thus creating language bias. As a result, there were only few data that could be used effectively in the analysis. Besides, the reliability of the study was reduced due to the high heterogeneity of the data.

**AUTHOR CONTRIBUTION**

Anwar Wahyudi was the main author who collected and processed the data. Didik Gunawan Tamtomo and RB Soemanto examined the conceptual framework and the study methodology.

**CONFLICT OF INTEREST**

We declare that there is no conflict of interest.
FUNDING AND SPONSORSHIP
This study did not use any funding and sponsorship due to the secondary data and the databases that could be easily accessed. It also provided open access journals.

ACKNOWLEDGEMENT
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REFERENCE


Elmawla DAEA, ABdelraf AI, Elsaid RAEEA (2019). Determinants of health-related quality of life among middle-aged and older stroke patients. World


