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 Burder 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

new strokes, died, and survived had doubled (Krishnamurthi et al., 2020).

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).

Stroke caused about a third of sufferers to have long-termphysical, 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.

Stroke caused various changes such asphysical, 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).

Stroke 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.

Eligibility Criteria

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

	Social support	Functional status	Depression
P	Patients after stroke	Patients after stroke	Patients after stroke
I	Strong social support	Good functional status	Major depression
C	Weak social support	Poor functional status	Minor depression
O	Quality of life	Quality of life	Quality of life

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).
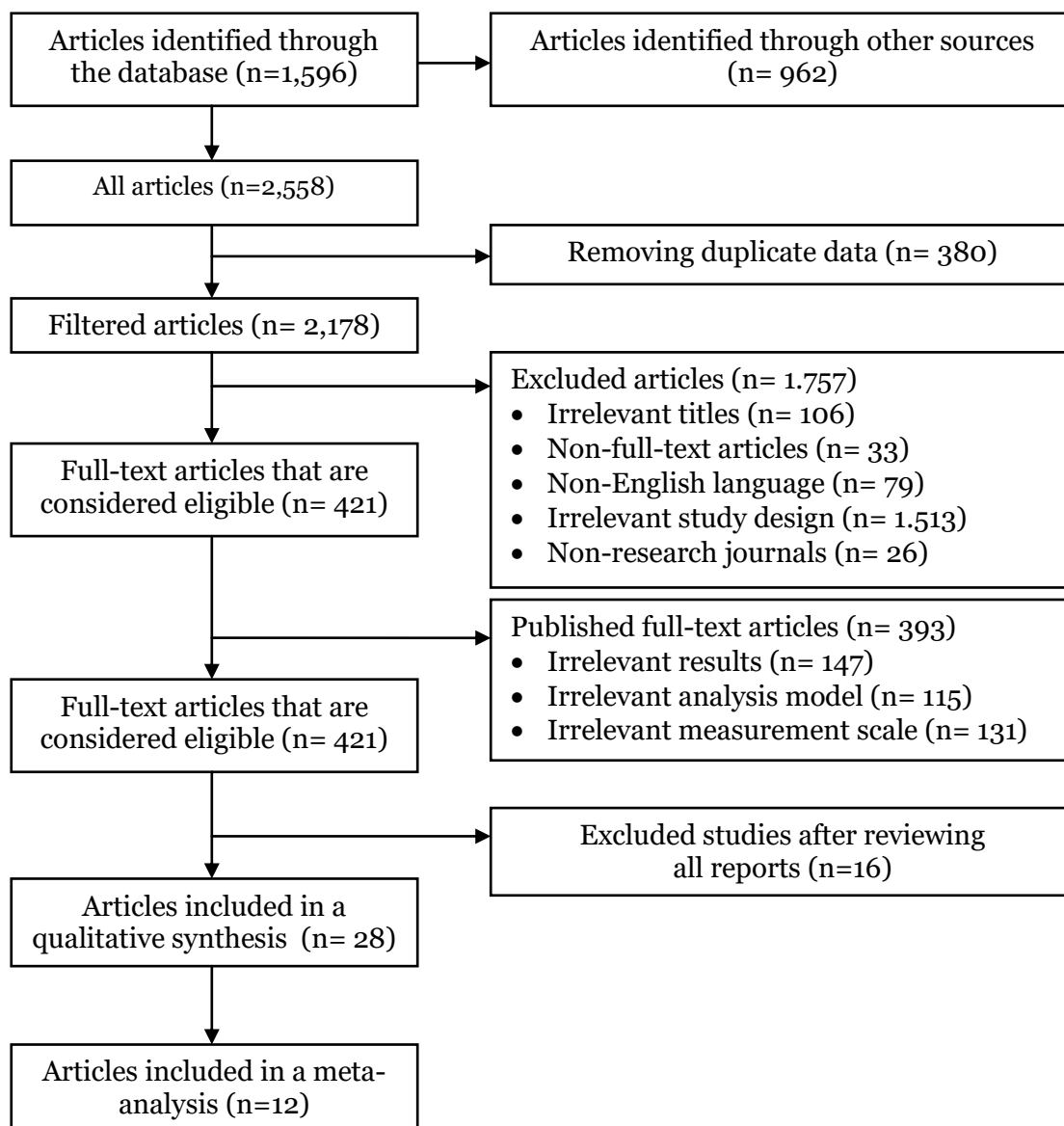
RESULTS

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.

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┌─────────────────────────────┐        ┌─────────────────────────────┐
│ Articles identified through │───────▶│ Articles identified through │
│   the database (n=1,596)    │        │    other sources (n= 962)   │
└─────────────────────────────┘        └─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│    All articles (n=2,558)   │
└─────────────────────────────┘        ┌─────────────────────────────┐
              │────────────────────────▶│ Removing duplicate data     │
              │                         │         (n= 380)            │
              ▼                         └─────────────────────────────┘
┌─────────────────────────────┐
│ Filtered articles (n= 2,178)│
└─────────────────────────────┘        ┌─────────────────────────────────────┐
              │                         │ Excluded articles (n= 1.757)        │
              │────────────────────────▶│ • Irrelevant titles (n= 106)        │
              │                         │ • Non-full-text articles (n= 33)    │
              ▼                         │ • Non-English language (n= 79)      │
┌─────────────────────────────┐        │ • Irrelevant study design (n= 1.513)│
│ Full-text articles that are │        │ • Non-research journals (n= 26)     │
│ considered eligible (n= 421)│        └─────────────────────────────────────┘
└─────────────────────────────┘
              │                         ┌─────────────────────────────────────┐
              │                         │ Published full-text articles (n= 393)│
              │────────────────────────▶│ • Irrelevant results (n= 147)       │
              │                         │ • Irrelevant analysis model (n= 115)│
              ▼                         │ • Irrelevant measurement scale (n= 131)│
┌─────────────────────────────┐        └─────────────────────────────────────┘
│ Full-text articles that are │
│ considered eligible (n= 421)│
└─────────────────────────────┘        ┌─────────────────────────────────────┐
              │                         │ Excluded studies after reviewing    │
              │────────────────────────▶│    all reports (n=16)               │
              ▼                         └─────────────────────────────────────┘
┌─────────────────────────────┐
│ Articles included in a      │
│ qualitative synthesis (n= 28)│
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│ Articles included in a meta-│
│     analysis (n=12)         │
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**Figure 1. Diagram flow of the study selection**

Table 1. The summary of source articles of the effect of social support on quality of life of stroke patients.

Author (year)	Age	Country	Study design	Total sample	Follow-up duration	Stroke, Social support, quality of life
Choi-Kwon et al., (2016)	≥ 60 years	South Korea	Cohort	135	12 months after stroke	- Stroke: MRI. - Social support: The ENRICHD Social Support Instrument - Quality of life: SF-36
Perry dan McLaren, (2004)	≥ 65 years	UK	Cohort	196	6 months after stroke	- Stroke: clinical check-up. - Social support; The Medical Outcomes Study Social Support Scale - Quality of life: Quality of Life Index

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; I² = 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 (β-coefficient = 0.03; 95% CI= 0.02 - 0.05; p = 0.0001). Therefore, strong social support improved the quality of life of stroke patients.
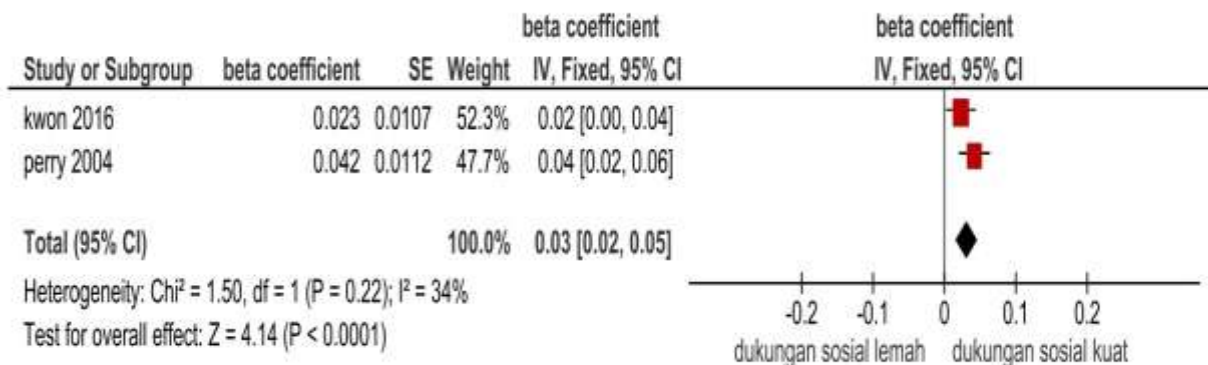
Figure 2. The forest plot of the meta-analysis of the effect of social support on the quality of life of stroke patients

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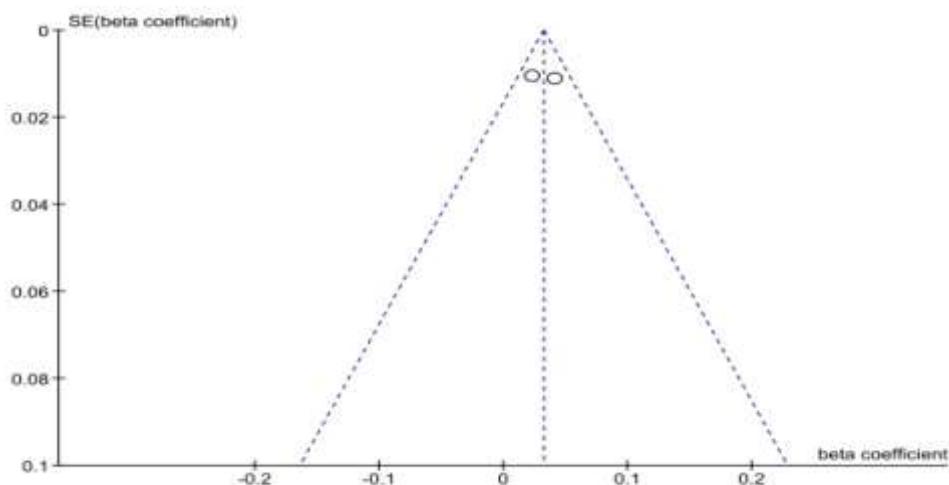
Figure 3 The funnel plot of the the meta-analysisof the effect of social support on the quality of life of stroke patients

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.

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

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; I^2= 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.
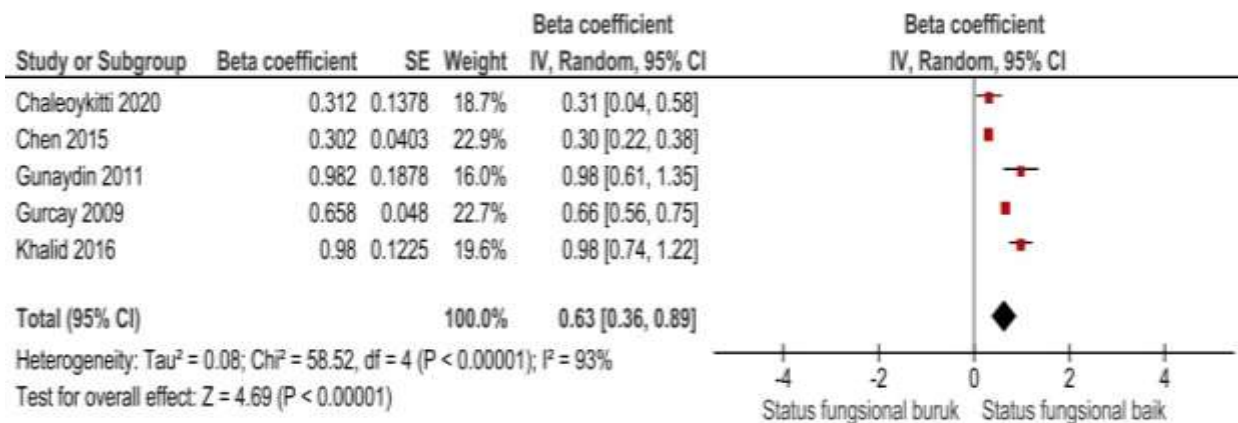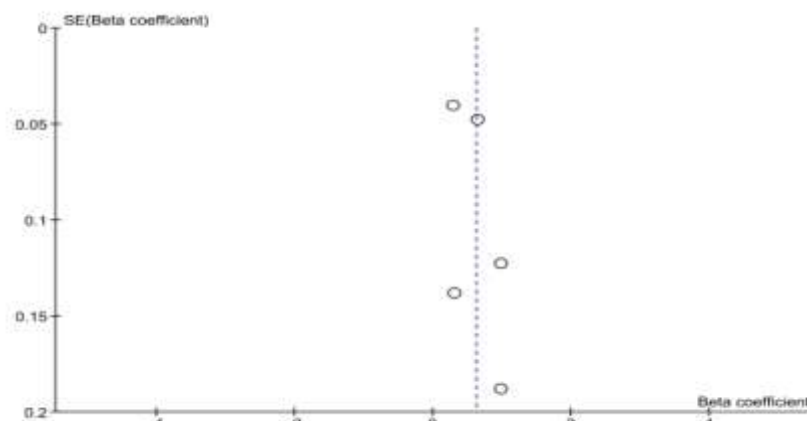

Figure 4. The forest plot of the effect of functional status on quality of life of stroke patients.

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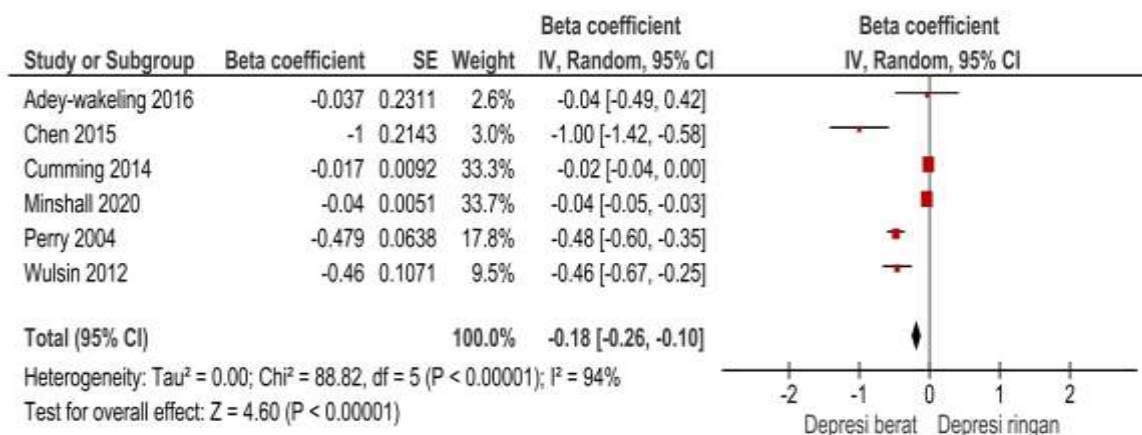
Table 3. The summary of source articles of the effect of depression on quality of life of stroke patients.

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

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 (β-coefficient= -0.18; 95% CI= -0.26 to -0.10; p = 0.00001). Therefore, major depression reduced the quality of life of stroke patients.

Study or Subgroup	Beta coefficient	SE	Weight	Beta coefficient IV, Random, 95% CI
Adey-wakeling 2016	-0.037	0.2311	2.6%	-0.04 [-0.49, 0.42]
Chen 2015	-1	0.2143	3.0%	-1.00 [-1.42, -0.58]
Cumming 2014	-0.017	0.0092	33.3%	-0.02 [-0.04, 0.00]
Minshall 2020	-0.04	0.0051	33.7%	-0.04 [-0.05, -0.03]
Perry 2004	-0.479	0.0638	17.8%	-0.48 [-0.60, -0.35]
Wulsin 2012	-0.46	0.1071	9.5%	-0.46 [-0.67, -0.25]
Total (95% CI)			100.0%	-0.18 [-0.26, -0.10]

Heterogeneity: Tau² = 0.00; Chi² = 88.82, df = 5 (P < 0.00001); I² = 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.
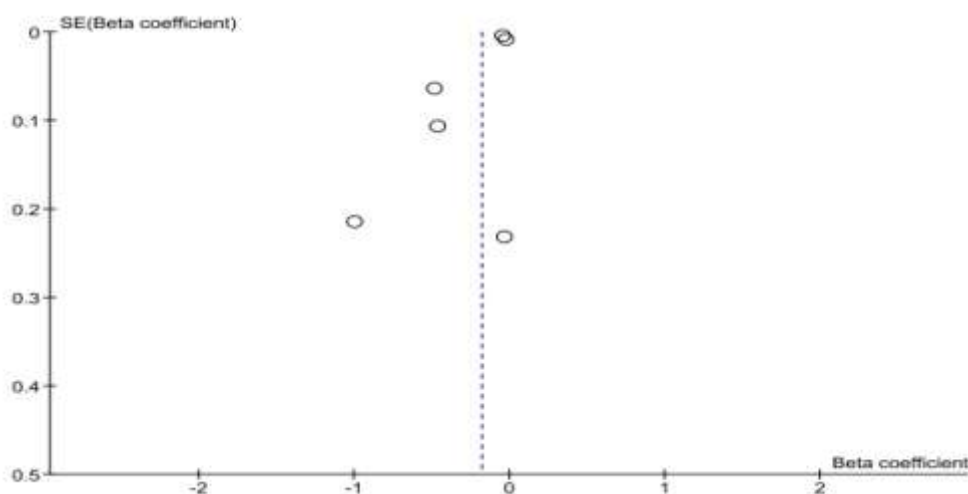
Figure 7. The funnel plot of the effect of depression on the quality of life of stroke patients

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.

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