Original Article

The Relationships among Locomotive Syndrome, Depressive Symptom, and Quality of Life in Older Adults Living in Rural Areas

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Objective: To investigate the relationships among locomotive syndrome, depressive symptoms, and quality of life in older adults living in rural areas.

Materials and Methods: The present research was a descriptive cross-sectional study. The sample was 160 community-dwelling older people living in sub-districts under the services of five health promoting hospitals located in Chiang Mai, Thailand. The prospective participants were recruited by multi-stage random sampling. They had completed instruments, including The Demographic Questionnaire, The 25-Question Geriatric Locomotive Function Scale, The 15-Item Geriatric Depression Scale, and The World Health Organization Quality of Life Questionnaire in Thai Elderly. The data were analyzed using descriptive statistics, Pearson's production-moment correlation.

Results: The findings revealed that the locomotive syndrome was found in 50% of participants with the cut-point score of 16 (mean 30.98, SD 14.03), while 26.9% of the participants revealed depressive symptoms (mean 7.07, SD 1.98). The participants had a good quality of life 79.4% (mean 105.12, SD 9.03). There was a positive correlation between locomotive syndrome and depressive symptoms ($r=0.47$, $p<0.01$). An inverse correlation was found between the locomotive syndrome and quality of life ($r=-0.56$, $p<0.01$) and between depressive symptoms and quality of life ($r=-0.46$, $p<0.01$).

Conclusion: Findings from the present study would be useful for the health care providers to design interventions to promote physical function along with psychological well-being.

Keywords: Locomotive syndrome, Depressive symptoms, Quality of life, Older adults

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Nowadays, Thailand has turned into an aging society. Older adults were commonly faced with age-related multidimensional changes in physical, mental, and social aspects. In terms of physical change, older adults tended to be degenerated, which affected their daily living[1]. Findings from a study conducted in Japan revealed that one-fourth of the crucial causes of nursing care facility admission for older adults were the locomotion and balance problems[1,2]. Notably, the locomotive problem or syndrome, a condition of reduced mobility due to the impairment of locomotive organs, especially muscle mass, muscle fibers, connective tissues, and ligaments, was commonly found in older adults than in any other ages[2]. In Thailand, similar to the other countries, based on the older adults' health status survey of 2013, the highest rate of health problems in older adults was locomotive syndrome, which was 57.8%[3]. Undoubtedly, the locomotive syndrome in older adults is likely to decrease their ability to perform

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daily activities such as standing, walking, running, or sitting, consequently, locomotive syndrome decreases their quality of life[4]. Evidence also reported that disorders or musculoskeletal and nervous system dysfunctions such as osteoporosis, osteoarthritis, fragility fracture, spondylosis, or spinal stenosis, and central nervous system disorders, may intensify the locomotive syndrome. As mentioned, suffering from locomotive syndrome affects the ability to perform daily activities and locomotion, resulting in increased pain, stiffness, and reduced balance function[2]. Because of these physical limitations, some people may have difficulties to take care of themselves, even to perform daily activities because of the suffering.

In general, the locomotive syndrome seems to be a hidden health condition since it does not cause any life-threatening events. However, the locomotive syndrome is a chronic condition influencing multiple dimensions-physical, mental, and social, which required much care and attention. For those who have locomotive syndrome, experiencing mobility limitation, pain, or stiffness while moving leads to increase risk of fall and disability, needing special assistance or long-term care[4]. Besides the increased time of recovery, the cost of care is higher, heightening concern about socioeconomic problems in this group. Furthermore, these complex problems, require adaptation by the older adults to live with the chronic illnesses, symptoms, or problems, which is more challenging[5]. Notably, older adults who have inappropriate adaptation would be more likely to have a considerable impact on mental health, especially depressive symptoms.

Locomotive syndrome is one of the health problems affecting the physical limitations, which potentially have a profound impact on depressive symptoms. Moreover, suffering from musculoskeletal conditions relating to physical limitations might develop into mental health problems. Besides, many studies underlined that age, pain severity, and functional limitation were related to depressive symptoms[6,7]. Therefore, the more suffering either from pain or physical limitation, the worse physical and mental health conditions in older adults[4]. Moreover, older adults might have less opportunity for social interaction resulting in inactivity and only stay at home[4,8]. Consequently, physical limitation and functional decline affected directly personal health leading to reduced quality of life[9]. Hence, understanding of the complex relationship and developing comprehensive care are necessary to be able to care for persons experiencing the locomotive syndrome together with depressive symptom to improve the quality of life.

Based on a comprehensive review, however, the gaps of locomotive syndrome care exist in some population. There is a lack of evidence in exploring the intricate relationship among locomotive syndrome, depressive symptoms, and quality of life in older adults living in rural areas. In Thailand, to bridge the gaps of care as mentioned earlier, a better understanding of this complicated relationship and its impact on older adults living in rural areas is also essential in promoting health and quality of life. The main purpose of the present study was to gain more understanding of this relationship in Thai older adults living in rural areas. Ultimately, the present study would provide fundamental knowledge for healthcare personnel to design holistic interventions to maintain psychological well-being and to promote quality of life among community older adults.

Materials and Methods

The study population and sample

The multi-stage random selection method was applied to recruit the prospective participants who live in rural areas, which are sub-districts under the services of five health promoting hospitals located in Chiang Mai province. The residents in rural areas are likely to have similar economic and career activities such as farming and food production. In addition, they build relationship that is more intimate and closely knitted. Each household tends to be larger than urban communities where a typical family includes various extended family members and their offspring. However, the rural population tends to lack access to infrastructure development, new production technology, entrepreneurship, and organization skills[10].

The sample size was calculated by using G*Power v.3.0.10[11]. The effect size was r=–0.23 obtained from a previous similar study[12]. A power of 0.80, and a significant level of 0.05 was also substituted in the calculated program. The sample size should be at least 146 individuals. The researchers added about 10% to be 160 to allow for dropout rate that may affect validity of the study. The older people who met the following criteria were recruited to participate in the present study, 1) aged 60 years and older, 2) able to communicate and understand Thai language or local dialect, 3) no evidence of cognitive impairment when evaluated by the Thai Mini-Cog (scores 3 points or higher)[13], and 4) agree to participate in the present study. The exclusion criteria were 1) presenting any

disability in walking or locomotion, vision, and hearing, 2) having a history of mental illness from medical records of the health promoting hospitals (e.g., schizophrenia, major depressive disorder, and bipolar disorder), 3) having a history of broken hip within six months or under treatment, 4) having a history of knee replacement, and 5) being bedridden.

The study instruments

The instruments used in the present study included the screening and the data collection tools as follows:

The screening tool was the Mini-Cog (Thai)[13]. This instrument was applied for cognitive impairment screening. The Mini-Cog (Thai) was tested for its reliability. The Kappa Coefficient was 0.80 and test-retest reliability was good (r=0.47).

The instruments used for collecting data included the Demographic Questionnaire, the 25-Question Geriatric Locomotive Function Scale, and the 15-Item Geriatric Depression Scale.

The 25-Question Geriatric Locomotive Function Scale (GLFS-25)[14] was used to measure locomotive syndrome in the present study. The GLFS-25 is a self-administered measure consisting of 25 items with four subscales that included pain (four items), activities of daily living (16 items), social functioning (three items), and mental health status (two items). Each item was a 5-Likert scale ranging from 0 (no impairment) to 4 (severe impairment). The total score was 0 to 100 with a score of 16 or higher considered as having the locomotive syndrome. It was translated into Thai by the researchers based on the back-translation method. The instrument was accepted of a good validity with content validity index (CVI) of 1, and in a pilot survey of 30 older adults, the reliability with Cronbach's alpha coefficient was 0.95. In the present study, among 160 participants, the Cronbach's alpha coefficient was 0.94.

The 15-Item Geriatric Depression Scale[15] was used to evaluate depressive symptoms. It was a 15-question with a yes or no format. The total score ranges from 0 to 15. The ranging score of 0 to 5, 6 to 10, and 11 to 15 was considered as no depression, depressive symptom, and depression, respectively. It was reported an excellent performance in detecting depressive symptoms by showing sensitivity and specificity value as 0.86 and 0.91, respectively. For the internal consistency reliability of the measurement, Cronbach's alpha coefficient was 0.82[15], while in the present study among 160 participants, the Cronbach's alpha coefficient was 0.75.

The World Health Organization Quality of Life Questionnaire in Thai elderly[16] was employed to assess the quality of life among older participants. There is a 25- item questionnaire including three components that represented the holistic quality of life with seven questions relating to physical, ten questions concerning psychosocial, and eight questions pertaining to spiritual components. The content validity reported a CVI of 0.84, while the construct validity was tested by factor analysis. The three components explained the variance in the quality of life, accounting for 44.90%. For reliability, the test-retest correlation demonstrated 0.90, and Cronbach's alpha coefficient was 0.89. In the present study, the Cronbach's alpha was 0.92.

Data collection

The data collection started after receiving approval from the Ethical Review Committee for Human Research of the Faculty of Medicine Ramathibodi Hospital (ID 12-61-79) and Chiang Mai Public Health Office. Besides, the five coordinators, the public health village volunteers, were recruited to facilitate data collection at the chosen health-promoting hospitals. The researchers approached the participants at their residence to introduce the study plan, clarify the objectives of the study, and explain the participants' rights in the study. If the participants agreed to participate, they were asked to sign a consent form. An interview method was used to avoid invalid data due to eyesight problems in reading the questionnaire.

Statistical analysis

Data were analyzed by using computer package PASW Statistics for Windows, version 18 (SPSS Inc., Mahidol License). No missing data was detected. After the assumption for inferential statistic use was checked, the analysis was performed by descriptive statistics and Pearson's product-moment correlation coefficient. The p-value of less than 0.05 was set for statistical significance.

Results

One hundred sixty-six prospective participants were approached; however, six older adults did not meet with inclusion criteria due to four older adults had cognitive impairment, one had depression, and one wished to stop providing information during the interview. Therefore, 160 older adults participated in the present study. Table 1 presents the data on personal information of the participants according

Table 1. Percentage distribution of personal information according to locomotive syndrome, depressive symptom, and quality of life (n=160)

Personal information	Total n (%)	LoS; n (%)		DS; n (%)		QoL; n (%)	
		Yes	No	Yes	No	Good	Moderate
Age (mean±SD: 68.94±7.4)							
60 to 74 year	130 (81.30)	58 (44.60)	72 (55.40)	25 (19.20)	105 (80.80)	116 (89.20)	14 (10.80)
75 to 84 year	20 (12.50)	13 (65.00)	7 (35.00)	13 (65.00)	7 (35.00)	8 (40.00)	12 (60.00)
85+ year	10 (6.20)	9 (90.00)	1 (10.00)	5 (50.00)	5 (50.00)	3 (30.00)	7 (70.00)
Sex							
Female	94 (58.80)	52 (55.30)	42 (44.70)	29 (30.90)	65 (69.10)	66 (70.20)	28 (29.80)
Male	66 (41.20)	28 (42.40)	38 (57.60)	14 (21.20)	52 (78.80)	61 (92.40)	5 (7.60)
Religion							
Buddhist	145 (90.60)	74 (51)	71 (49)	37 (25.50)	108 (74.50)	115 (79.30)	30 (20.70)
Christians	15 (9.40)	6 (40.00)	9 (60.00)	6 (40.00)	9 (60.00)	12 (80.00)	3 (20.00)
Marital status							
Couple	91 (56.90)	40 (44)	51 (56)	21 (23.10)	70 (76.90)	82 (90.10)	9 (9.90)
Widowed/divorced/separated	60 (37.60)	37 (61.70)	23 (38.30)	20 (33.30)	40 (66.70)	36 (60.00)	24 (40.00)
Single	9 (5.60)	3 (33.30)	6 (66.70)	2 (22.20)	7 (77.80)	9 (100)	0 (0.00)
Household type							
Lived with families	139 (86.90)	69 (49.60)	70 (50.40)	37 (26.60)	102 (73.40)	111 (79.90)	28 (20.10)
Lived alone	21 (13.10)	11 (52.40)	10 (47.60)	6 (28.60)	15 (71.40)	16 (76.20)	5 (23.80)
Sufficiency of income							
Earned enough and had money left for saving	26 (16.30)	8 (30.80)	18 (69.20)	6 (23.10)	20 (76.90)	25 (96.20)	1 (3.80)
Enough monthly income, but not having money left for saving	97 (60.60)	47 (48.50)	50 (51.50)	23(23.70)	74(76.30)	80(82.50)	17 (17.50)
Not earned enough monthly income	37 (23.10)	25(67.60)	12 (32.40)	14(37.80)	23 (62.20)	22 (59.50)	15 (40.50)
Education							
Informal education	2 (1.30)	2 (100)	0 (0.00)	0 (0.00)	2 (100)	0 (0.00)	2 (100)
Primary school	140 (87.50)	74 (52.90)	66 (47.10)	39 (27.90)	101 (72.10)	110 (78.60)	30 (21.40)
High school	14 (8.80)	4 (28.60)	10 (71.40)	4 (28.60)	10 (71.40)	13 (92.90)	1 (7.10)
Bachelor degree	4 (2.50)	0 (0.00)	4 (100)	0 (0.00)	4 (100)	4 (100)	0 (0.00)
Social activity in the last month							
Not participating in activities	52 (32.50)	29 (55.80)	23 (44.20)	17 (32.70)	35 (67.30)	35 (67.30)	17 (32.70)
Attended social activities*	108 (67.50)	51 (47.20)	57 (52.80)	26 (24.10)	82 (75.90)	92 (85.20)	16 (14.80)
Religious activities	85 (53.10)	38 (44.70)	47 (55.30)	23 (27.10)	62 (72.90)	72 (84.70)	13 (15.30)
Members of the senior clubs	36 (22.50)	15 (41.70)	21 (58.30)	5 (13.90)	31 (86.10)	29 (80.60)	7 (19.40)
Volunteers in community activities	13 (8.10)	3 (23.10)	10 (76.90)	0 (0.00)	13 (100)	12 (92.30)	1 (7.70)
Number of underlying diseases							
≥2	58 (36.30)	41 (70.70)	17 (29.30)	18 (31.00)	40 (69.00)	39 (67.20)	19 (32.80)
1	52 (32.50)	26 (50.00)	26 (50.00)	15 (28.80)	37 (71.20)	43 (82.70)	9 (17.30)
None	50 (31.30)	13 (26.00)	37 (74.00)	10 (20.00)	40 (80.00)	45 (90.00)	5 (10.00)

LoS=locomotive syndrome; DS=depressive symptom; QOL=quality of life; SD=standard deviation

* More than 1 answer

to locomotive syndrome, depressive symptoms, and quality of life.

The locomotive syndrome was found in 50% of participants with the cut off value of 16, while 26.90% of participants revealed depressive symptoms. The participants had a moderate and good quality of life (20.60% and 79.40%, respectively) (Table 2).

Table 3 illustrates that the locomotive syndrome

Table 2. Percentage distribution, mean, and standard deviation of locomotive syndrome, depressive symptom, and quality of life in older adults living in rural areas (n=160)

Variable	n (%)	Mean±SD
Locomotive syndrome	160 (100)	18.59±1.27
LoS	80 (50.00)	30.98±14.03
Non-LoS	80 (50.00)	6.20±3.64
Depressive symptom	160 (100)	3.36±0.22
DS	43 (26.90)	7.07±1.98
Non-DS	117 (73.10)	1.99±1.34
Quality of life	160 (100)	100.59±0.98
Good	127 (79.40)	105.12±9.03
Moderate	33 (20.60)	83.18±6.52
Physical domain	160 (100)	27.34±4.79
Good	108 (67.50)	30.00±2.96
Moderate	50 (31.30)	22.10±2.36
Poor	2 (1.30)	15.00±1.41
Psychosocial domain	160 (100)	40.54±5.16
Good	124 (77.50)	42.58±3.72
Moderate	36 (22.50)	33.50±2.60
Spiritual domain	160 (100)	32.71±3.99
Good	125 (78.10)	34.29±2.81
Moderate	35 (21.90)	27.09±1.93

LoS=locomotive syndrome; DS=depressive symptom

Table 3. Pearson's product-moment correlation matrices (n=160)

Variable	1	2	3
Locomotive syndrome	1		
Depressive symptom	0.47*	1	
Quality of life	–0.56*	–0.46*	1

* p<0.01

had a moderate positive significant relationship with depressive symptoms (r=0.47; p<0.01). However, older adults with locomotive syndrome had a high negative significant relationship with quality of life (r=–0.56; p<0.01). Besides, participants with depressive symptoms had a moderate negative significant relationship with quality of life significantly (r=–0.46; p<0.01).

Discussion

The findings of the present study revealed that half of the older participants (50%) had locomotive syndrome. In the present study, the average age of the participant was 68.94 years old (SD 7.4). Similarly, other studies[17,18] also reported that locomotive syndrome was likely to occur in older adults especially at the age of 70 years and older. This similarity might be due to the homogeneity of the average age of the sample between the present study and those other studies. The additional reason may be explained that age-related decline may induce the locomotive syndrome. The advancing age might have degenerative changes in the locomotive organs, which causes musculoskeletal diseases as osteoporosis, osteoarthritis, fragility fracture, spondylosis, sarcopenia, and other neurological disorders. Most of the symptoms present with pain, stiffness, and the reduction in balance ability[2].

Regarding the depressive symptoms in older adults, the findings revealed that 73.10% of the participants were considered as no depressive symptoms. The explanation of the present study findings might be because most of the participants (67.50%) regularly participated in social activities, which could help and support older adults as social networks in providing information for health promotion leading them to maintain their potential in self-care, to support them to use free time effectively, and to support proper changes in the aged. This result agrees with previous study[19] pinpointing that there was no substantial evidence of depressive symptoms in older adults who participated in senior citizen clubs indicating that they might still perform daily activities. However, 26.9% of the present study participants had depressive symptoms. The low prevalence of depressive symptoms might be affected by other related factors such as physical health conditions or the limitation in bodily function. Besides, half of the participants presenting locomotive syndrome had at least one or more chronic diseases. The findings of the present study were in accordance with the previous study in Japan that reported 27.5% had depressive symptom. Moreover, 13.9% of older adults that had locomotive syndrome had more risk of having depressive symptom than those without locomotive syndrome (odds ratio [OR] 4.22)[4].

The finding of the present study revealed that the overall quality of life of this population were moderate to good level, with good at 79.40% and moderate at 20.60%. This is similar to a previous study[20] that reported that older adults were more likely to have a high level of quality of life. The explanation of the present study findings might be because the participants were young older adults with less limitations in performing daily activities, yet more independence as they were able to join

social activities even though most of the participants had comorbidities. In addition, the lifestyle of the participants living in rural areas with sufficiency in economic life, agricultural environment, and sharing objects or foods with others might be the key to enhance quality of life[21]. In addition, most of the study participants earned enough monthly incomes and had social support such as living with spouses or their children that it could be assumed that having friends or assistance affected the encouragement and safety in life, self-care ability[22], and life satisfaction[23,24].

Locomotive syndrome had statistically significant positive relationships at a moderate level with depressive symptoms ($r=0.47$; $p<0.01$). It was due to the chronic conditions of locomotive syndrome, which affects older adults to suffer from limitations in mobility and chronic symptoms including pain and stiffness[25]. In addition, evidence emphasized that people with locomotive syndrome were more prone to develop depressive symptoms than those without (adjusted odds ratio [AOR] 1.15)[26]. On the other hand, depressive symptom reduces the pain tolerance level, which might intensify locomotive syndrome[27,28]. Older adults experiencing severe pain would feel anxious or depressed and did not want to move to reduce the pain, resulting in limiting themselves to living at home only, and declining interaction with others, leading to depressive symptoms.

Locomotive syndrome also had a statistically significant negative relationship with the overall quality of life ($r=-0.56$; $p<0.01$). The present study finding was congruent with a previous study[29], which indicated that locomotive syndrome had relationship with quality of life in older adults. This is because the locomotive syndrome in older adults affected mobility, which was an essential activity in performing daily activities such as performing housework, heavy lifting, working, and hanging out. This problem also had an impact on emotion and satisfaction, which gradually changed, leading to a reduction in quality of life. This was the individual perception of satisfaction of health conditions including physical, mental, and social aspects.

However, not only the locomotive syndrome had a negative relationship to quality of life, but also depressive symptoms had a statistically significant negative relationship with a moderate level with the quality of life ($r=-0.46$; $p<0.01$). The findings were in agreement with a previous study[30], which indicated that depressive symptoms had a profoundly negative relationship to quality of life, especially the physical aspect of quality of life. The older adults might feel fear of movement, fear of fall, and difficult in going out leading them to be dependent conditions. Besides, physical limitations cause older adults to be dependent or being a burden of the families. Consequently, they may lessen social interaction, all of these mentioned led to a decline in quality of life[31].

The authors' study was the first study investigating the locomotive syndrome that is newly be focused in Thai older adults, and examined the association among locomotive syndrome, depressive symptoms, and quality of life among older adults living in rural areas. The participants were recruited from only one province, they might be different from another region, in terms of characteristics of population such as size, socioeconomics, and health service requirement. Therefore, generalizability may be limited when applying these findings. A larger sample size along with multi-settings is recommended for further study.

Conclusion

The present study results underlined the association among the locomotive syndrome, depressive symptoms, and quality of life in older adults living in rural Thailand. The increase of locomotive syndrome was related to the depressive symptoms and the reduction in quality of life. Moreover, the depressive symptom was also related to the reduction in quality of life. The present study finding would be useful for the health care providers to design holistic health interventions to promote quality of life among older adults and to maintain their psychological well-being and prevent them from requiring long-term care.

What is already known on this topic?

The locomotive syndrome, a deterioration of locomotive components, leads to locomotor organ diseases resulting in musculoskeletal ambulation disability, physical limitation, and mobility impairment.

The locomotive problem is common in older adults, which has a significant impact on multi-dimensions of health, leading to decreased quality of life and increased long-term care needs.

There is a lack of evidence of the relationship among locomotive syndrome, depressive symptoms, and quality of life in older adults living in rural areas.

What this study adds?

The locomotive syndrome is common and more prevalent in Thai older adults. The locomotive syndrome is associated with increasing depressive

symptoms and decreasing quality of life in older adults living in rural areas.

This study provides fundamental knowledge for healthcare personnel to design holistic interventions to maintain psychological well-being and to promote quality of life among community older adults who have or are at risk of locomotive syndrome.

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Conflicts of interest

The authors declare no conflict of interest.

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