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Original Article

Public Health Section

Musculoskeletal Disorders and Quality of Life of Sugarcane Farmers in the Northeast of Thailand: A Cross-sectional Analytical Study

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ABSTRACT

Introduction: Musculoskeletal Disorders (MSDs) were directly associated with Quality of Life (QOL). It could cause various adverse consequences to daily life function, psychological health, work capacity and income.

Aim: To identify the prevalence of MSDs and its association with QOL among sugarcane farmers.

Materials and Methods: This cross-sectional analytical study was conducted among 529 samples selected through multistage random sampling from 3 provinces of the Northeast (NE) of Thailand to respond to the WHO-QOLBREF questionnaire. Multiple logistic regression was administered to determine the association between MSDs and QOL when other covariates were controlled.

Results: It was found that as high as 74.29% (95% CI: 70.83-77.84) of sugarcane farmers had MSDs and 36.29% (95% CI: 32.29-40.49) had poor QOL. MSDs were significantly associated with poor QOL (Adjusted OR=3.01; 95% CI: 1.84-4.94; p<0.001). Other significant covariates were psychological factors including: depression (Adjusted OR=2.09; 95% CI:1.41-3.10; p<0.001), high and severe levels of stress (Adjusted OR=2.11; 95% CI: 1.43-3.13; p<0.001), worked >8 hours per day (Adjusted OR=2.45; 95% CI: 1.57-3.81; p<0.001), and had monthly income ≤13,000 Baht (Adjusted OR=1.69; 95% CI:1.14-2.52; p=0.008).

Conclusion: MSDs and other covariates including psychological factors, depression, severe levels of stress, long working hours and low income were associated with poor QOL. Therefore, ergonomic behaviour modification including body preparation before work, proper working postures, and rehabilitation were needed to improve the QOL among the sugarcane workers in Northeast Thailand.

Keywords: Ergonomic behaviours, Musculoskeletal disorder, Quality of life, Sugarcane farmer

INTRODUCTION

The Royal Thai government had policies to encourage rice farmers to switch its crop production to sugarcane which resulted in increasing areas of sugarcane plantations. Sugarcane plantation areas have been rising to around 17,600 square kilometers, or 30% increased from 2009 to 2016 [1], making Thailand as one of the world top five sugar exporter countries [2], with the value of 2.4 billion US dollars in 2016 [3].

Despite advancement in agricultural machineries, human workforces are still at need in sugarcane plantations. Sugarcane plantation consists of 4 steps; soil preparation, planting, nurturing, harvesting and transporting. Sugarcane farmers are more likely to have ergonomic problems including lifting heavy objects, blending, and twisting in planting processes [4]. Therefore, MSDs is one of the most important health problems affecting sugarcane farmers with the symptoms of sprain, stiffness, and soreness of musculoskeletal system that is primarily caused by repetitive motion, awkward posture, forceful exertion, vibration and stress [5]. Besides the direct effect on health, MSDs limit the performance of daily living and work activities [6]. The severity of musculoskeletal discomfort/pain is associated with total fatigue [7], when the discomfort/pain severity increased, concentration/focus decreased. MSDs lead to the large socio-economic burden which is responsible for the extensive use of health services and absenteeism on the work site due to illness as well as loss of productivity and disability compensation [8].

QOL is individuals' perception on life quality with relevant to cultural and value context of the society on their goals, expectations, standards on physical, psychological, social health and environment [9]. The reduction of work capability which affects psychosocial symptoms such as sadness, loss of energy, helplessness is strongly likely to be associated with MSDs and QOL [10]. MSDs cause various adverse consequences, ranging from an inability to perform the labour activity which first caused the disorder, to execution of simple tasks of daily living such as housework and self-care activities [11].

In Thailand, prevalence of MSD was higher than 80% [4]. This is a serious burden for health service. Thereby, many studies have been carried on effect of MSDs on QOL in various groups emphasizing on healthy people of all age and gender groups and patients of various diseases and occupations. However, few studies were conducted among sugarcane farmers who were vulnerable to ergonomic related health problems. The Northeast of Thailand has the tropical largest land which is suitable for cultivating sugarcane, accounting for around 45 percent of total sugarcane production in 2018 [12]. There were more than 1.5 million famers involved in sugarcane cultivation [13]. These farmers were mostly involved in long working-hours intensive jobs with ergonomic risk practices. Therefore, this study aimed to identify the prevalence of MSDs and its association with QOL among sugarcane farmers in the Northeast of Thailand with a hypothesis that MSDs had influence on QOL of sugarcane farmers.

MATERIALS AND METHODS

This cross-sectional analytical study was conducted from March 2017 to August 2017 in the Northeast of Thailand. The structured questionnaire interview was performed on their work place by researchers. The research proposal as well as the tools were approved by the Ethics Committee of Khon Kaen University (reference no. HE592384). The inclusion criteria were sugarcane farmers aged 18-59 years old, have been working in sugarcane plantation for at least one year, could verbally communicate with researcher and voluntarily participate in the study. The exclusion criteria were those who were diagnosed as having gout, osteoarthritis, rheumatoid arthritis, osteoporosis, had history of severe musculoskeletal injury or if had history of operation to treat MSDs, and had severe physical or mental problems.

The sample size was calculated using the sample size estimation formula of Hsieh [14] for a logistic regression, which identified the association between multiple independent variables and a dichotomous outcome of having poor quality of life or not. The sample size of 234 was initially calculated and was further adjusted for over-fitting control, using rho (ρ) of 0.40 and Variance Inflation Factor (VIF) equal to 1.67; finally the total sample was 529. These samples were selected from the population by using the multistage random sampling. In the Northeast, there were 10 provinces that had sugarcane refinery factories [13]. Three out of 10 provinces where the sugarcane refinery factories situated (UdonThani, Kalasin, and Surin) were randomly selected. Secondly, 2 districts were selected from each province randomly. Finally, 2 sub-districts were randomly selected from each district. Then, simple random sampling was applied to select the sample proportional to the size of sugarcane farmers of each sub-district, therefore the total of 529 samples were selected. This study recruited 6 trained researchers for the data collection. In addition, all farmers were explained regarding objectives, methods, and harms and benefits of this research before signing a written consent form.

Instrument

A structured questionnaire was developed based on literature reviews in response to the research questions. The questionnaire consisted of 6 parts: Part1: Demographic and socioeconomic characteristics consisted of gender, age, chronic disease, alcohol drinking, income, and debt. Part 2: Work condition covered the employment status; number of days worked in a week, and daily working hours. Part 3: Standardized Nordics questionnaire is a subjective method used to assess MSDs of 9 body parts for the period of 7 days and 12 months [15]. Part 4: Depression was assessed using a 9-Questions depression rating scale which was normally used for depressive disorder surveillance in Thailand. The 9 items covered frequency of depressive symptoms [bored, sleeping, tired, and suicide etc.,) during the past 2 weeks. Four rating scales were scored by 0,1,2 and 3 added up to 0-27 scores. Total scores were categorized in 4 levels of normal (<7 scores), mild (7-13 scores), moderate (13-19 scores), and severe (>19 scores) [16]. Part 5: The Suanprung Stress Test-20 (SPST-20) developed by the Department of Mental Health, Ministry of Public Health which was widely used to screen stress level. The 20 questions with 5 rating scales were used to assess the stress. Total stress scores were divided into 4 groups, including mild (0-24 scores), moderate (25-42 scores), high (43 – 62 scores), and severe (>63 scores) [17]. Part 6: WHO-BREF questionnaire was used to measure the level of QOL, asking the perception about their life in the last two weeks. The 26 items with 5 rating scales consisted of 7 items of physical health, 6 items of mental health, 3 items of social relationship, 8 items of environment, and 2 items for overall QOL [9]. The range of total score was between 26 and 130, which was categorized in 3 groups of poor, moderate, and good level of QOL (26-60, 61-95, and 96-130 scores, respectively). The tool had high level of reliability with Cronbach's alpha of 0.84.

STATISTICAL ANALYSIS

Data were analysed using the statistical package of Stata version 10.0. Demographic and socioeconomic characteristics of the sugarcane farmers were described as frequency and percentage for categorical data whereas mean, standard deviation and median were for continuous data. Inferential statistics, a simple logistic regression, was used for bivariate analysis to identify individual factors associated with QOL. The WHO-BREF QOL scores was categorized with the cut point ≤60 for a poor level of QOL and >60 scores for the average and good QOL levels. Multiple logistic regression was used to determine the association between MSDs and QOL when controlling other covariates. The initial analysis started with bivariate analysis of individual independent variable with poor level of QOL presented by crude OR and p-value. The factors that had p-value <0.25 were processed into a multivariable analysis model. The backward elimination modeling which initially included all factors and consequently removed factors that were not significant. The final model presented adjusted odds ratio (Adjusted OR), confidence interval (95% CI), and the levels of significance with p-value <0.05.

RESULTS

More than half of the farmers were female with the average age of 41.61±8.46-year-old, 76.94% worked for not more than 8 hours per day, 76.37% worked more than 5 days/week. The average monthly income was 13,685.72±3,716.76 Baht and over 80% were in debt.

About one-third (35.92 %) of the farmers drink alcohol, 34.59% were smokers. As high as 20.23% had chronic disease of which, the most common were diabetes, hypertension, and peptic ulcer. About half had high level of stress (50.28%) and 37.43% had moderate level of stress and 36.48 % had depression [Table/Fig-1].

Variable	Number (%)
Gender	
Male	253 (47.83)
Female	276 (52.17)
Age (years)	
≤40	244 (46.13)
>40	285 (53.87)
Mean±SD: 41.61±8.46 years, Median (Min, Max): 42 years (19,59)	
Income (Baht)	
>13000	231 (43.67)
≤13000	298 (56.33)
Mean±SD: 13,685.72±3,716.76 Baht, Median (Min, Max): 13,000 (6,000, 25,000)	
Debt	
No	81 (15.31)
Yes	448 (84.69)
Worked day in a week (days)	
≤5	125 (23.63)
>5	404 (76.37)
Mean±SD: 6.26±1.25 days, Median (Min, Max): 7 (2,7)	
Worked hour in 1 day (hours)	
≤8	407 (76.94)
>8	122 (23.06)
Mean±SD: 8.45±1.31 hours Median (Min, Max): 8 (4,12)	
Alcohol drinking	
No	339 (64.08)
Yes	190 (35.92)
Smoking	
No	346 (65.41)
Yes	183 (34.59)
Chronic disease	
Yes	107 (20.2)
No	422 (79.8)
Stress	
Mild	52 (9.83)
Moderate	198 (37.43)
High	266 (50.28)
Severe	13 (2.46)
Depression	
Normal	336 (63.52)
Mild	75 (14.18)
Moderate	98 (18.53)
Severe	20 (3.78)

[Table/Fig-1]: Demographic and socioeconomic characteristics, work factors, health behaviour, and health status of the sugarcane farmers.

As high as 74.29% of the sugarcane farmers had MSDs during the past 7 days. The most common body parts with MSDs were shoulders, lower back, knees, hands and wrists. 58.78% has moderate pain, 32.57% had mild level and 8.65% with severe pain [Table/Fig-2].

MSDs	Number (%)	95%CI
Overall of MSDs	393 (74.29)	70.83-77.84
Shoulders	283 (53.50)	49.21-57.72
Lower back	281 (53.12)	48.84-57.35
Knees	130 (24.57)	21.08-28.43
Hands and wrists	106 (20.04)	16.83-23.67
Neck	86 (16.26)	13.34-19.66
Upper back	62 (11.72)	9.23-14.76
Hip and thighs	57 (10.78)	8.39-13.72
Elbows	27 (5.10)	3.51-7.34
Foot and ankles	23 (4.35)	2.90-6.46
Level of severity		
Mild	128 (32.57)	28.09-37.38
Moderate	231 (58.78)	53.81-63.56
Severe	34 (8.65)	6.23-11.88

[Table/Fig-2]: Musculoskeletal disorders among sugarcane workers during the past 7 days.

One third (36.29%) of the farmers had poor QOL. However, almost similar proportion had good QOL (32.33%: 95% CI: 28.46-36.44) and the smallest proportion had moderate level of QOL (31.38%) [Table/Fig-3].

Level of QOL	n (%)	95% CI
Poor (26-60 scores)	192 (36.29)	32.29-40.49
Moderate (61-95 scores)	166 (31.38)	27.55-35.47
Good (96-130 scores)	171 (32.33)	28.46-36.44
Mean±SD: 78.58±18.29, Median (Min, Max): 81(49,122)		

[Table/Fig-3]: Level of quality of Life of sugarcane farmers.

In the bivariate analysis using simple logistic regression, the individual factors that were statistically significant with poor QOL were: had MSDs (OR=3.09; 95%CI: 1.92-4.95), had monthly income not more than ≤13000 Baht (OR=1.83; 95% CI: 1.26-2.64), worked >8 hours/day (OR= 2.51; 95% CI:1.26-2.64), had high and severe levels of stress (OR=1.93; 95% CI: 1.34-2.77) and were depressed (OR=2.14; 95% CI:1.48-3.10) [Table/Fig-4].

Factor	Number	% poor QOL	Crude OR	95% CI	p-value
Musculoskeletal disorders					<0.001*
No	136	19.12	1		
Yes	393	42.24	3.09	1.92-4.95	
Gender					0.003*
Male	276	30.43	1		
Female	253	42.69	1.70	1.19-2.42	
Age (Year)					0.777
≤40	244	35.66	1		
>40	285	36.84	1.05	0.73-1.50	
Income (Baht)					0.001*
>13000	258	28.57	1		
≤13000	271	42.28	1.83	1.26-2.64	
Debt					0.389
No	81	32.10	1		
Yes	448	37.05	1.24	0.75-2.06	
Work/day (Hour)					0.001*
≤8	408	31.20	1		
>8	121	53.28	2.51	1.26-2.64	
Worked day/week (day)					0.893
>5	406	36.14	1		
≤5	123	36.80	1.02	0.67-1.56	
Drinking alcohol					0.059
No	339	33.33	1		
Yes	190	41.58	1.42	0.98-2.05	
Smoking					0.624
No	361	35.55	1		
Yes	168	37.70	1.09	0.75-1.59	
Chronic disease					0.119
Yes	107	29.91	1		
No	422	37.91	1.43	0.90-2.26	
Stress					<0.001*
Mild and moderate	250	28.40	1		
High and severe	279	43.37	1.93	1.34-2.77	
Depression					<0.001*
Normal	336	29.76	1		
Depressed	193	47.67	2.14	1.48-3.10	

[Table/Fig-4]: Factors influencing poor quality of life of sugarcane farmers: a bivariate analysis.
p-value <0.05 has been considered as statistically significant (*)

MSDs were significantly associated with having poor QOL of sugarcane farmer in the Northeast of Thailand with the adjusted OR of 3.01 (95% CI:1.84-4.94; p-value<0.001). Other covariates that were significantly associated with poor QOL of these farmers were: working >8 hours. per day (Adjusted OR=2.45; 95% CI:1.57-3.81; p-value<0.001), having depression (Adjusted OR=2.09; 95% CI: 1.41-3.10; p-value<0.001), having high and severe levels of stress (Adjusted OR=2.11; 95% CI: 1.43-3.13; p-value<0.001), had average monthly income <13,000 Baht (Adjusted OR=1.69; 95% CI: 1.14-2.52; p-value=0.008) [Table/Fig-5].

Factor	Total number	% poor QOL	Crude OR	Adjusted OR	95% CI	p-value
Musculoskeletal disorders						<0.001*
No	136	19.12	1			
Yes	393	42.24	3.09	3.01	1.84-4.94	
Work/day (hours)						<0.001*
≤8	408	31.20	1			
>8	121	53.28	2.51	2.45	1.57-3.81	
Depression						<0.001*
Normal	336	29.76	1			
Depression	193	47.67	2.14	2.09	1.41-3.10	
Stress level						<0.001*
Mild and moderate	250	28.40	1			
High and severe	279	43.37	1.93	2.11	1.43-3.13	
Income (Baht)						0.008*
>13000	258	28.57	1			
≤13000	271	42.28	1.83	1.69	1.14-2.52	

[Table/Fig-5]: Factors influencing quality of life of sugarcane farmers: a multivariable analysis.
p-value <0.05 has been considered as statistically significant (*)

DISCUSSION

Our results indicated that about one third (36.29%) of the sugarcane farmers had poor QOL, but 32.33% had good QOL. As high as 74.29 % had MSDs, of which shoulders, lower back, knees, hands and wrists were the most common body parts with MSDs. In addition, more than half were suffered with moderate pain (58.78%) and 8.65% were with severe pain. The famers with poor QOL might suffering from MSDs that caused pain, discomfort, fatigue, activity of daily living, mobility, sleep and rest [8,18-20]. These findings were supported by the multivariable analysis results that MSDs were significantly associated with poor QOL with the adjusted OR of 3.01 (95% CI=1.84-4.94; p<0.001). In addition, some research also reports the association between MSDs and QOL, especially the impact on fatigue, sleep and rest [21,22]. Chronic back pains were associated with lower scores on QOL aspect of body pain, physical functioning, and limitation of daily activities [23].

Work impairment related to chronic pain was often associated to psychological impact. The strong association between MSDs and QOL is explained by the reduction of work capability, which affects psychosocial symptoms such as strain, sadness, anxiety and depression [24]. Our results indicated the influence of mental disorder on QOL which were depression (Adjusted OR=2.09; 95% CI=1.41-3.10; p<0.001), high and severe levels of stress (Adjusted OR=2.11; 95% CI=1.43-3.13; p<0.001). Absence from work and reduction in productivity are the consequence of depression. People with depression had difficulty in working and interacting with the family as well as engaging with society. Some depressive symptoms include loss of interests, feeling worthless and poor perception on life [25]. As above mentioned, farmers who had suffered from MSDs cannot work efficiently. Work efficiency was decreased by increased working hours. Although, they had poor physical health, they still worked; possibly because the basic needs and necessary facilities were important factor relating to QOL. Our multivariable analysis result, found that long working period was highly associated with having poor QOL (Adjusted OR=2.53). A previous study reported the impact of long working hours on physical and mental health i.e., the farmers who had long working hours were suffered with MSDs. The impact of long working hours on physical health was explained by a physiological recovery mechanism [26]. In addition, there was a study reporting an association between increasing weekly working hours (>44 hours) and depression (Adjusted OR=1.60 (95% CI=1.01-2.55) [27]. The possible explanations might be that they had to continuously work since their employers wanted to promptly transport sugarcane to a factory in order to overcome the competition on limited number of trucks, sugarcane weight loss after cutting, long distance and time consuming queue. They might rotate to work with other trucks and work for night shift. Some of them had to work overtime for setting fire in order to get rid of sugarcane's leave which was common practice before harvesting.

Not only poor physical and mental health was negatively associated with QOL, but also financial resources. Some studies indicated the association between income and QOL, however, the balance of income and expense had stronger relationship with well-being than absolute monthly income [28]. It was similar with our current study which indicated that lower income were associated with QOL (Adjusted OR=1.64). It could be explained that sound income was essential for not only basic needs and facilities but also for the next season of sugarcane cultivation. Having low income could force the farmers to work even when they were suffering with physical health problems such as MSDs especially when they were in debt.

LIMITATION

A cross-sectional study design in nature could not identify a causal relationship since both independent and a dependent variable being assessed at the same time. It is suggested that further studies should apply a prospective cohort or experimental study for a causal relationship.

CONCLUSION

As high as three quarters of sugarcane farmers in the Northeast of Thailand had MSDs of which the major part were shoulders and lower back. More than one-third of these farmers had poor QOL. MSDs and other covariates including: psychological factors, depression and severe levels of stress, long working hours and low income were associated with poor QOL. Our finding suggested that behaviour modification especially on ergonomic including body preparation before work, proper working postures, and rehabilitation were needed to be implemented effectively. Proper assistant on both physical working condition and psycho-social assistant should be promptly implemented.

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