ERGONOMIC RISK FACTORS AND WORK ABILITY AMONG REGISTERED NURSES IN OPERATING ROOMS, BANGKOK, THAILAND

Umarat Kaewcharern[1], Sara Arphorn[1,*], Orawan Kaewboonchoo[2], Chalermchai Chaikittiporn[1], Vichai Prukthartharathikul[1], Wattasit Siriwong[3]

[1]Department of Occupational Health and Safety, Faculty of Public Health, Mahidol University, Bangkok 10400, Thailand
[2] Department of Public Health Nursing, Faculty of Public Health, Mahidol University, Bangkok 10400, Thailand
[3]College of Public Health Sciences, Chulalongkorn University, Bangkok 10330, Thailand

ABSTRACT: The study aims were to determine work ability of registered nurses in operating rooms in Ramathibodi hospital and to describe the relationship among general characteristics, working characteristics, working posture, work environment, and nurses' work ability. Based on a cross sectional descriptive study, 112 of 141 the self-administered questionnaires (79.4%) were returned to the researcher. The results showed that most of the nurses had a good work ability (62.5%), very good work ability (13.4%), medium work ability (23.2%), and poor work ability (0.8%). The significantly associated factor for general characteristics with work ability was age *($p<0.05$).* The ergonomic risk factors which covered working characteristics, working posture, physical working environment, and psychological factors were revealed to be significantly associated with work ability ($p<0.05$). The results showed the relationship between ergonomic and work ability after using stepwise multiple regression analysis. The job strain was significantly associated with work ability ($p<0.05$). In conclusion, age, working posture, working task, working physical environment, psychological factors affected the work ability among nurses. This suggested that the improvement of working conditions and psychological factors at the workplace will enhance their work ability. Ergonomics intervention should be introduced to avoid awkward posture and to reduce muscular workload and working characteristics and psychological issues must be taken into account.

Keywords: Work Ability / Ergonomic risk factors / Working Posture / Working Environment

INTRODUCTION

Ergonomics is an applied science related to biology, psychology, physiology, anatomy and engineering. Its aims are to reduce risk factors for all concerned. The importance of ergonomics in terms of the increasing productivity and its efficiency is now well known. Risk factors of back pain in nurses are from lifting, bending and twisting [1]. The health effect reported from working in hospital was musculoskeletal disorders, MSDs (55%) [2]. The cause of MSDs among registered nurse and practical nurse was manual handling. A high risk group of nurses was the working in the operating room. The study of Meijsen and Knibbe showed that pain of registered nurse in an operating room were at neck/shoulder (53%) and 48% was found at head /leg/foot [3]. The risk factors were the prolonged standing and material handling. The hazard of the working environment in operating rooms also covered chemical hazards, physical hazards, psychological hazards, biological hazards and ergonomic hazards [4].

The work ability is characterized by the balance between a worker's individual resources and demands of the work. The principal resources include health, capacity, competence and values [5]. The components of work ability were working task and working environment. Ilmarinen et al. mentioned that it should have the harmonization of health promotion, capacity building and the working environment improvemen [5]. The working participation process especially between supervisor and operators in health protection, learning motivation and a positive attitude constructive should be promoted. Working ability focuses on the working life. Therefore, work ability is necessary for nurses who are working hard in an operating room.

**Correspondence to: Sara Arphorn*
E-mail: phsao@mahidol.ac.th

METHOD

The study was a cross-sectional descriptive study using a self-administered questionnaire to investigate relationships of ergonomics risk factors and the work ability among nurses in operating room. These operating rooms were selected because there were many complicated cases done where the high technology and many types of equipment were operated.

SUBJECTS

A purposive sampling technique was performed. A total number of registered nurses in 5 units of operating room were 141 nurses. One hundred

forty-one questionnaires were sent to the subjects and one hundred twelve questionnaires were returned to the researcher (response rate 79 %). Data was collected from 15 December 2009 to 31 January 2010. The ethical consideration was approved by the ethics committee of the Ramathibodi Hospital with the certified code ID 08-52-04.

QUESTIONNAIRES

The working characteristic questions were adapted from Lorsuwankul [6]. The 22-items Job Content Questionnaires (JCQ) was introduced to access psychological job stress at work [7]. This questionnaire showed 4-point likert scale. 1, 2, 3, and 4 scale represented strongly disagrees, disagree, agree and strongly agree, respectively. The questions showed 4 components of stress based on the JCQ namely decision latitude, psychological demands, supervisor social support, and coworker social support. The total score was calculated using the standardized formula. Then, the score was classified into 2 groups by the median value to be high risk group and low risk group. A modified basic screening tool of Occupational Safety and Health Administration (OSHA) checklist was used for ergonomic survey [8]. Risk factors covered the repetition, force and awkward postures were investigated. Thai version of Workability Questionnaire [9] was introduced for the workability index (WAI) investigation. It included seven parts covered the current work ability compared with the lifetime best, the work ability in relation to the demands of the job, the number of current diseases diagnosed by a physician, the estimated work impairment due to diseases, the sick leave during the past year, the own prognosis of work ability 2 years from now and mental resources [10]. WAI is a summary measure of seven items (range 7–49).

DATA ANALYSIS

Descriptive statistics were used for gender, number of exercises, level of education, height, weight, body mass index (BMI), years of working experience, age, working task, working hours and working ability scores. The correlation among working characteristics, working posture, working environment, and working ability were determined by Pearson Product Moment Correlation Coefficient. The working environment included physical, chemical and biological working environment. The Chi-Square was introduced to identify association among ages, working hours, working experience and working ability. Multiple Regression Analysis was used to determine correlation between working ability and individual characteristics, working characteristics, working posture, and working environment.

RESULTS

The general characteristics included data such as group of nurses, age, gender, weight, height, body mass index, level of education, marital status, exercise, status of work, and working experience.

Table 1 General characteristics of registered nurse in operating room

Individual factors	Number (n=112)	(%)
Age (year)		
20-29	57	50.9
30-39	38	33.9
≥ 40	17	15.2
Mean SD	31.8 ±8.0	
Gender		
Male	5	4.5
Female	107	95.5
Height (cm.)		
150-159	54	48.2
≥ 160	58	51.8
Mean ±SD	160.2 ±5.4	
Body weight (kg)		
40-49	48	42.9
50-59	47	42.0
≥60	17	15.2
Mean ±SD	52.0 ±7.0	
BMI		
< 18.5	28	25
18.5-22.9	69	61.6
≥ 23	15	13.4
Mean ±SD	20.3 ±2.5	
Individual factors	**Number (n=112)**	**(%)**
Marital status		
Single	78	69.6
Married	34	30.4
Highest education		
Bachelor degree	87	77.7
Master degree	25	22.3
Work Experience (years)		
1- 5	42	37.5
6-10	34	30.4
≥11	36	32.2
Mean ± SD	9.1 ±7.5	
Exercise (times/weeks)		
No	62	55.4
Yes (1-3)	50	44.6
Duration of Exercise (minutes/time)		
No	62	55.4
10-20	17	15.2
30-60	33	29.4

Table 2 Category of work ability among registered nurses in operating room.

Category	Score	Number (n=112)	% of Nurses
Poor	7-27	1	0.9
Medium	28-36	26	23.2
Good	37-43	70	62.5
Very good	44-49	15	13.4
Mean(SD) = 39.3(4.3)			
Min - Max = 26-48			

Table 3 The relationship between age and the work ability of registered nurses in the operating room.

Individual Factor	Level of work ability						p-value
	Poor , Medium		Good , very good		Total		
	Number	%	Number	%	Number	%	
Age(Year)							
20-29	10	17.5	47	82.5	57	100	0.04*
30-39	9	23.7	29	76.3	38	100	
≥ 40	8	47.1	9	52.9	17	100	

*=Significant level at p< 0.05

Table 4 The correlation between working characteristics, working posture, working environment, psychological job stress and the work ability.

Variables	Work ability	
	Pearson 's correlation (r)	p-value
Working characteristics	0.22	0.02*
Working posture	0.23	0.01*
Physical working environment	0.19	0.04*
Chemical working environment	0.17	0.07
Biological working environment	0.15	0.12
Psychological Job Stress		
Psychological Job demand	-0.22	0.02*
Decision Latitude	0.13	0.18
Job stress	-0.29	0.01*
Supervisor social support	0.14	0.15
Co-worker social support	0.17	0.07

*=Significant level at p< 0.05

Table 1 demonstrates the general characteristics data of the subject. The subjects were 112 registered nurses. Most nurses aged between 20-29 years (50.9%), the most of them were female (95.5%), weight between 40-49 kg. (42.9%) and height ≥ 160 cm (51.8%). The ranges of body mass index were between 18.5 - 22.99 (61.6%). It showed that the majority of the studied group demonstrated normal body mass index. Most of the nurses were single (69.6%), the majority had a bachelor degree (77.7%), most of them with working experience of 1-5 years (37.5%). Fifty five point four percent of the registered nurses did not perform the exercise.

Working ability was classified into 4 groups according to the score obtained from the work ability questionnaire. Table 2 shows category of work ability of a registered nurses. Most nurses showed good work ability (62.5%). Only one nurse showed poor work ability (0.9%).

Using Chi-Square Test, it was found that only the age was significantly associated with work ability ($p < 0.05$) (Table 3). Gender, height, weight, BMI, highest education, marital status, experience of work and exercise demonstrated no significant association with the work ability. The correlation between working characteristics, working posture, working environment and the work ability were determined by Pearson Product Moment Correlation Coefficient. Table 4 shows that working characteristics, working posture and physical working environment had low relationship with the work ability, while psychological job demand and job stress revealed a negative relationship.

The correlation between individual characteristics, working characteristics, working posture, working environment and the work ability were determined by Multiple Regression Analysis. The jobs strain showed significant association with the work ability.

PREDICTION FORMULA

Job strain was found to be an influence on work ability with the value of Multiple- regression coefficient of -24.259 and job strain can predict 7.4 percent of work ability. (Shown in equation 1 and Table 5)

Work Ability Index = 45.243-24.259 job strain.....(eq. 1)

Table 5 The Influence of Job Strain on Work Ability Index

Variable	b	Beta	t	p-value
(Constant)	45.243		19.772	.000
Job strain	-24.259	-0.273	-2.680	.009*
	R^2 =0.074	F=7.18	Sig <0.05	

*=Significant level at p< 0.05

DISCUSSION AND CONCLUSION

The general characteristics in this study showed that age was significantly associated with work ability (Table 3). The results of Monteiro et al. showed that work ability decreased significantly with age among the public health women [11]. The younger group had higher scores on the work ability index than the older age groups. The logistic regression analysis showed that higher age was significantly associated with reduced work ability. Gould showed that the limitation of work ability increased with age [12].

The working tasks which would be performed in different divisions, status of work, working hours, were not significantly associated with work ability. Working characteristics were significantly associated work ability ($p<0.05$) (Table 4). The result in this study was similar to other studies. Tuomi et al. showed that good work ability was associated with a high quality of work and the enjoyment of staying in one's job [13]. Jan and Elin studied on the Instruments Assessment of Work Characteristics. It

was suggested that the client has to use different working skills to perform an effective work task [14].

The working posture among nurses included standing, sitting, lifting, pushing and other awkward postures. Most of them often performed repetitive work, standing in straight posture. They sometimes straightened their leg during bending, sitting in back straight posture during the scrub nurse activities. The working posture was significantly associated with work ability *($p<0.05$)* (Table 4). The result in this study was agreed with Tuomi et al. [15]. It was confirmed that the deterioration of work ability would be shown with the reduction of recognition, esteem at work, and less physical exercise and inappropriate workroom conditions. While the prolonged standing at work affected low work ability.

This study showed that physical environment was significantly associated with work ability *($p<0.05$)* (Table 4). It was similar to Gould and Tuomi et al. [12, 16]. They demonstrated the impact of work ability would be shown by mental symptoms and musculoskeletal disease. The work stresses included high physical demands at work, a poor physical work environment and the lack of freedom were associated with impaired work ability.

Related to the psychological environment in this study, it was found that psychological job demand and job stress were significantly associated with work ability *($p<0.05$*). The job strain was found to have influence on work ability. The job strain can predict 7.4 percent of work ability *($p<0.05$).* It was agreed with the study of Lea [17]. A high level of social support increased the probability of a high positive evaluation of the work ability in 5 years time and a high level of predictability in terms of being informed about decisions that concern the work place increased the probability of a more positive evaluation of the work ability in 10 years time. Chiu et al. revealed that the mental demands of work were a critical influence on their work ability [18]. Gould demonstrated that a group of no illnesses with poor work ability was associated with the stress, job insecurity and problem of work community and supervisory work [12]. The group of workers who had good work ability with long-term sick was associated with good education and a rewarding job. Tuomi et al. showed that good work ability was associated with a high quality of work and the enjoyment of staying in one's job [13]. It also predicted an active and meaningful retirement period.

LIMITATION OF STUDY

This study was designed to investigate the work ability of registered nurses using self-administrative questionnaires. The researcher gave them some time to fill up the questionnaire and asked them to leave it at their own office. The nurses might have discussed some issues in the questionnaires with their friends before responding to the questionnaire. The limiting factor of this study may be the personal bias of the nurses.

RECOMMENDATION

The work ability among registered nurses could be enhanced by the improvement of working conditions and the psychological concerned issues especially job strain.

The ergonomics intervention should be introduced to avoid awkward posture and to reduce muscular workload. The working characteristics must be taken into account. The training on ergonomics and job stress should be provided for all hospital staff. The hospital management related to occupational health policy should cover all ergonomic issues to prevent these problems and injuries.

The curriculum for a professional nurse should contain patient handling, for example; standing, sitting, lifting, pushing and other awkward postures. The course content must include the practice of patient handling with a good working posture. The health exercise should be encouraged to improve the muscular strength.

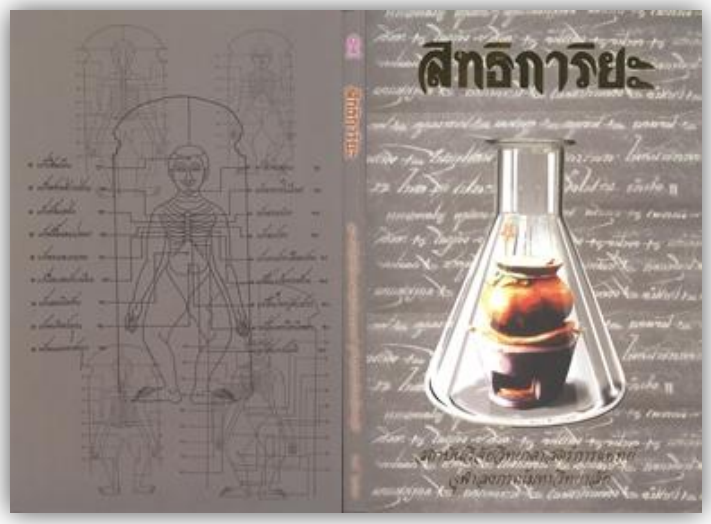
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หนังสือที่น่าสนใจ

สิทธิการิยะ: รวมบทความอาศรมความคิดยาจากสมุนไพรกับการแพทย์ทางเลือก



... “ **สิทธิการิยะ** มาจาก สิทธิ์ + การย์ คำ ๆ นี้ เป็นคำที่ “ผู้เป็นครู” อนุญาตหรือสั่งเอาไว้ ต้องกระทำตามจึงเกิด “ผล” ดังนั้นในคาถาต่างๆ จึงปรากฏคำๆ นี้นำหน้าเสมอ... ”

... “ ตำรายาไทยเก่า ๆ มักพบคำที่ขึ้นต้นว่า **“สิทธิการิยะ”** ท่านว่าให้เอาเทียนดำหนัก ๑ บาท ดอกบุนนาค ๑ ... เวลาหมอโบราณจะเขียนขึ้น ก็จะเริ่มต้นด้วยคำว่า **“สิทธิการิยะ”** แล้วจึงบอกถึงตัวยา ขนาดยา วิธีทำยา และลงท้ายด้วยขนาดรับประทานเสร็จสรรพ การเขียนตำรายาโดยขึ้นต้นด้วยคำว่าสิทธิการิยะนั้นเป็นดังคำอธิษฐาน ตามความหมายแล้ว หมายถึงอธิษฐานว่า “ขอให้กรรมนี้ จุ่งประสบสัมฤทธิผล เทอญ ... ”

... “การใช้สมุนไพรให้ได้ประโยชน์และถูกต้อง จะต้องใช้ให้ถูกต้น ถูกส่วน ถูกโรค ถูกวิธี ถูกขนาด... ”

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