ORIGINAL ARTICLE

Prevalence and Risk Factors of Work Related Upper Limb Disorders (WRULD) Among Female Telephone Operators in a Telecommunication Centre in Kuala Lumpur

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ABSTRAK

Sebuah kajian prevalen telah dilaksanakan terhadap 79 orang operator telefon wanita yang berkhidmat di sebuah Pusat Telekomunikasi di Kuala Lumpur untuk menentukan prevalen penyakit anggota atas berkaitan kerja dan faktor-faktor risikonya. Pengumpulan data kajian telah dilaksanakan dari bulan Disember 2000 sehingga bulan Mei 2001. Soal selidik dan pemeriksaan fizikal telah digunakan untuk menentukan gred penyakit ini. Kadar respon untuk kajian ini adalah 94.9% (n=75) dan hasil menunjukkan bahawa prevalen penyakit anggota atas berkaitan kerja di kalangan operator telefon adalah 48.0%: Peringkat 1= 38.9%, Peringkat 2= 19.4%, Peringkat 3= 38.9%, Peringkat 4= 0% and Peringkat 5= 2.8%. Didapati bahawa subjek yang menghidapi penyakit ini mempunyai min tempoh berkhidmat di pusat telekomunikasi tersebut selama 11.59±9.09 tahun, manakala subjek yang tidak menghidapi penyakit ini, min tempoh berkhidmat adalah selama 9.89±8.48 tahun. Faktor-faktor yang dikaji seperti Indeks Jisim Tubuh, umur, etnik, kitaran haid, pengambilan terapi hormon, tempoh perkhidmatan di dalam unit dan di pusat telekomunikasi tidak berbeza di antara subjek yang menghidapi dan tidak menghidapi penyakit anggota atas berkaitan kerja. Ini mungkin disebabkan oleh saiz sampel yang kecil atau kesan 'healthy worker' yang boleh dilihat di dalam kajian kesihatan pekerjaan. Hasil kajian ini menunjukkan bahawa hampir 40.0% dari pekerja mengalami simptom sakit dan neurologikal. Memandangkan tiada dari faktor yang dikaji mempunyai hubungan dengan penyakit anggota atas berkait pekerjaan, kajian dengan reka bentuk kawalan kes diperlukan untuk membolehkan kes dipadankan dengan kawalan yang sesuai supaya faktor pembaur boleh dikawal. Ini untuk memastikan faktor risiko yang berkaitan dengan anggota atas di kalangan pekerja Malaysia dapat dikenalpasti.

Kata kunci: penyakit anggota atas berkaitan kerja, pergerakan berulangan, operator telefon, pusat telekomunikasi

ABSTRACT

A study was carried out on 79 female telephone operators working in a Telecommunication Centre in Kuala Lumpur to determine the prevalence of Work Related Upper Limb Disorders (WRULD) and its risk factors. Data collection for this study was done between December 2000 and May 2001. The presence of WRULD was determined based on a guided questionnaire and physical examination. The response rate for this study was

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94.9% (n= 75) and results showed that the prevalence of WRULD among the female telephone operators was 48.0%: Stage 1= 38.9%, Stage 2= 19.4%, Stage 3= 38.9%, Stage 4= 0% and Stage 5= 2.8%. In the telecommunication centre, it was found that those with WRULD had a mean of 11.59±9.09 years of employment duration whereas those without WRULD had a mean of 9.89 ± 8.48 years of employment duration. None of the factors studied such as Body Mass Index, age, ethnicity, menstrual cycle, hormone replacement therapy, overtime work, duration of employment in the present unit and in the telecommunication centre differ in distribution between subjects with and without WRULD. This could be contributed by factors such as small number of subjects or the common healthy worker effect found in occupational health research. The findings studied of this study show that almost 40.0% of the workers experienced pain and neurological symptoms. Since none of the factors was found to be associated with WRULD, an elaborate study with a case-control design is needed in order to match cases and enable researchers to control the effect of confounding factors. This will ensure risk factors pertinent to WRULD in the Malaysian setting to be identified.

Key Words: Work Related Upper Limb Disorders (WRULD), repetitive motion, telephone operators, telecommunication centre.

INTRODUCTION

Development of new technologies and increase in the number of industries is the scenario observed in most developing countries. More occupations are created alongside these industries and high economic growth is anticipated. In the wake of the creation of new occupations in these industries, highly repetitive motion patterns in the work situation are common. This work situation which involves repetitive movement and overuse of certain musculoskeletal system is often the cause of pain in the upper limb region. This can give rise to Work Related Upper Muscular Disorders (WRULD) (Maeda et al 1982). WRULD is also synonymous with work related musculoskeletal disorder (WMSD), cumulative trauma disorders (CTD), repetitive strain injury (RSI), occupational overuse syndrome (OOS) and occupational cervico-brachial disease (OCD) (Yassi 1997).

WRULD is defined as any changes around the tendon-muscle unit, peripheral nerves and vascular system of the muscle (Grieco et al 1998, Hagberg 1996, Armstrong et al 1993). WRULD can be divided into Type 1 and 2, where Type 1 is denoted by specific clinical symptoms and can be grouped into specific clinical diagnosis such as lateral epicondilitis, De Quervain disease and Carpal Tunnel syndrome. The latter type of WRULD is classified as Type 2 and it is a non-specific condition affecting certain parts of the upper limb from neck to fingers, which commonly presenteds with pain (Hutson 1997).

The incidence of WRULD is high among industrial workers and computer user office workers (Hocking 1987). The USA Labor Statistics Unit (1994) reported a 32% absenteeism due to WRULD as a result of repetitive motion and overuse condition. These disorders involved the wrist joint (55%), shoulder (7 %) and back (6 %). In Australia, there were 343 cases diagnosed with WRULD among 1000 telephone operator, between 1981 till 1985 (Hocking 1987).

The risk factors for WRULD are multi factorial and work has been recognized as one of the risk factor (Grieco et al 1998, Hagberg 1996, Armstrong et al 1993). These work conditions include repetitive motion, use of force, ergonomic problem

related to inappropriate positioning, exposure to vibration, cold temperature and psychosocial environment at the work place (Williams and Westmorland 1994, Stobbe 1996, Hagberg 1996, Colombini 1998).

WRULD has been reported in many occupations such as cashiers, meat cutters, packing operators, telephone operators and musician. In Malaysia, few studies on WRULD have been done. Cardosa and Wan Yusof (1992) found that 50% of data processor personnel in a public department and 66% of telecommunication operators had experienced neck and shoulder pain. Abd Ghani (1995) reported that 50% out of 1670 workers from six factories complained of upper limb and back pain. Studies on WRULD among telecommunication workers in Malaysia have been limited, except for a study by Premalatha in 1995, where it was found that prevalence of WRULD among 323 telecommunication workers was 31.2%. With the passing of years and increase use of new technology which concentrates on creation of new machines with better accessibility, the prevalence of WRULD may have significantly changed since the last study in 1995 (Premalatha 1995). For comparison, a current study on telecommunication workers was carried out. Hence, with this aim in mind, a study was done to determine the prevalence and risk factors of WRULD among telecommunication operators.

MATERIALS AND METHODS

This cross sectional study was carried out among female telephone operators working in a telecommunication centre under the Directory Unit in Kuala Lumpur between December 2000 and May 2001. There were 79 female workers included in the study and they make up the entire force of the Directory Unit. Permission to carry out the study was obtained from the Medical and Ethics Research Committee of Universiti Kebangsaan Malaysia.

The female workers were interviewed by the researcher using questionnaire inquiring information pertaining to socio demographic factors such as weight, height, age, ethnicity, menstrual cycle, hormone replacement therapy (HRT), overtime work, duration of employment in the present unit and in the telecommunication centre; occupational history, past medical history and symptoms and signs of neck and upper limb disorders. The physical examination included inspection of the neck and upper limbs to confirm any disorders or previous injury. The power and tendon reflexes of the biceps, triceps and brachioradialis were also tested. The sensation for both pain and light touch of the upper limbs were tested using a needle and cotton wool. A full neurological examination was performed in the upper limbs. Additional signs looked for included the Phalen's test, Tinel's test, Fikelstein sign, muscle atrophy and range of movements at the shoulder, elbow and wrist joints. The height and weight were measured using measuring tape and Salter bathroom scale. The bathroom scale was calibrated after each weight measurement.

The telecommunication centre operates from 7 am to 7 pm everyday and staff may either have normal or shift working hours. A normal working hour was from 8.30 am to 5 pm (Mondays to Fridays) and from 8.30 am to 12.45 pm on Saturdays. The shift working hours were either 6.5 or 8 hours. The shift work hours is shown in Table 1.

Table 1: Shift working hours in the Directory Unit of the telecommunication centre

Number of shift work hours	Working hours
6.5 hours	7 am to 1.30 pm
	8 am to 2.30 pm
	9 am to 3.30 pm
	10 am to 4.30 pm
	12.30 pm to 7 pm
8 hours	8.30 am to 5 pm
	9 am to 5.30 pm
	10 am to 6 pm

Those shift workers were given two days off after 12 working days. The workers had 20 minutes of break time in the morning and one hour of break time for lunch (on Friday two hours lunch break except those working on shift). All activities were fully computerized since 1988.

WRULD is defined as the presence of pain in any part of upper limb area that is either continuous or episodic for a day or more or any abnormalities found during physical examination such as muscle atrophy, muscle spasm, pain or tenderness during palpation, reduce range of movement, reduced power or the presence of neurological signs. The Body Mass Index (BMI) was considered normal if the value was between 18 and 25, low if less than 18 and overweight if more than 25. The exclusion criteria included history of injury to the upper limbs including fracture or dislocation which could cause weakness or alteration sensation in the upper limbs, history of neurological disorders such as poliomyelitis, any connective tissue disorders such as SLE and rheumatoid arthritis, endocrinological disorders that could cause carpal tunnel syndrome, or muscle weakness such as thyrotoxicosis and acromegaly and those who had a part time job that increased the risk for WRULD. WRULD was graded using the Japanese grading as explained in Table 2 (NOHSC, 1986).

Data collected were later analyzed using the SPSS 9.0 software. The Chi square test was used for categorical data and independent t-test was used for numerical data. The level of significance was set at $p< 0.05$.

RESULTS

Seventy nine female workers agreed to participate in this study. The response rate obtained was 96.2% (n=75). Three workers were excluded from the study because they had rheumatoid arthritis, history of trauma with neurological signs.

The majority of the workers were Malay (92%, n=69) and less than 40 years of age (68%, n=51). Eighty four percent (n=63) were taller than 150 cm, 92% (n=69) were right handed and 50.7% (n=38) were overweight and obese. Most of them had been working for less than 10 years (66.7%, n=50); 53.3% (n=40) worked in shifts of 6.5 hours and the majority (53.3%, n=40) had resting times of 50 minutes per working time. Seven subjects were pregnant and one respondent was on HRT after total hysterectomy and bilateral oophorectomy (Table 3).

Thirty six subjects were diagnosed as having WRULD which makes the prevalence of WRULD to be 48% (Table 4). The subjects diagnosed with WRULD were further classified according to five different stages according to severity. The majority of the subjects with WRULD were categorized in to Stage 1 (38.9%, n=14) and Stage 3 (38.4%, n=14). There were 19.4% (n=7) subjects in Stage 2, none in Stage 4 and 2.8% (n=1) respondents

Table 2 : Grading of WRULD

Grade	Severity
0	No disease
1	Subjective complaint of recurrent pain of upper limb lasting more than 2 days but there is no physical sign
2	In addition to the symptoms in grade 1, there is a physical sign such as tenderness, swelling or spasm in the region of neck, shoulder or upper limb.
3	In addition to symptoms in grade 2 with neurological or sensory disturbance i.e paraesthesia, numbness and/or weakness
4	Many of the symptoms in grade 3 but with more extensive sensory disturbance, more advanced decrease of muscle power and increased number of positive neurological signs
5	More severe than stage 4 with disturbance of work and daily activities

Table 3: Socio demographic distribution and Occupational History of Subjects

Characteristics	Number of Subjects (n)	Percentage (%)
Ethnicity		
Malay	69	92.0
Chinese	1	1.3
Indian	4	5.4
Others	1	1.3
Age		
< 40	51	68.0
≥ 40	24	32.0
Height(cm)		
< 150	12	16.0
≥ 150	63	84.0
Body Mass Index		
Normal(18 – 25)	37	49.3
Over weight and obese(> 25)	38	50.7
Hormonal Status		
Normal Menstrual Cycle	61	81.3
Menopause without taking HRT	6	8.0
Pregnancy	7	9.4
Post TAHBSO with HRT	1	1.3
Handedness		
Right	69	92.0
Left	9	8.0
Duration of Work at Telecom		
1 – 10 years	50	66.7
/ > 10 years	25	33.3
Duration of Work at Directory Unit, 103		
1 – 10 years	55	66.7
> 10 years	20	33.3
Type of working hours		
Office Hours	22	29.3
Shift 6 ½ hours	40	53.3
Shift 8 hours	13	17.4
Overtime job		
Yes	31	41.3
No	44	58.7
Duration of rest per working time		
50 minutes	40	53.3
80 minutes	28	37.3
120 minutes	7	9.4

Table 4 : Prevalence of WRULD among female telephone operators

WRULD	Fequency (n)	Percentage (%)
Present	36	48.0
Absent	39	52.0
TOTAL	**75**	**100.00**

Table 5 : Distribution of subjects according to stage of WRULD

Stage of WRULD	Number of subjects (n)	Percentage (%)
Stage 1	14	38.9
Stage 2	7	19.4
Stage 3	14	38.9
Stage 4	0	0.0
Stage 5	1	2.8
TOTAL	**36**	**100.0**

Table 6 : Risk Factors for WRULD

Risk factors	WRULD			
	Present	Absence	X^2 value	*p* value
Ethnicity				
Malay	31	38	0.099	0.083
Non-Malay	5	1		
Age				
< 40	26	25	0.471	0.307
≥ 40	10	14		
BMI				
Normal	14	23	0.107	0.066
Overweight or obese	22	16		
Height				
< 150 cm	5	7	0.757	0.436
≥ 150 cm	31	32		
Handedness				
Right	34	35	0.676	0.376
Left	2	4		
Hormonal Status				
Regular menstrual Cycle	31	30	2.611	0.456
Menopause	3	3		
Pregnancy	2	5		
TAHBSO with HRT	0	1		
Overtime work				
No	19	25	0.356	0.224
Yes	17	14		
TOTAL	35	39		

* Significant value p< 0.05; statistical test= Chi square test

Table 7: Duration of employment in the unit and in the telecommunication centre

	WRULD	Number of subjects (n)	Mean (years)	Standard deviation	*t*-value	*p* value
Duration of service in the unit	Absent	39	8.59	6.67	0.311	0.757
	Present	36	8.14	5.80		
Duration of service in the centre	Absent	39	11.59	9.09	0.836	0.406
	Present	36	9.89	8.48		

* Significant value p< 0.05; statistical test= Independent *t*-test

classified in Stage 5 (Table 5). None of the recognized risk factors were significant ($p > 0.05$) in this study (Table 6). Mean duration of employment among subjects with and without WRULD was 11.59 ± 9.09 and 9.89 ± 8.48 years respectively. Mean duration of service at the Directory Unit for subjects with WRULD was 8.59 ± 6.67 years and for those without WRULD, the mean duration of service was 8.14 ± 5.80 years. None of the employment duration factors showed any association with the presence of WRULD among the subjects (Table 7).

DISCUSSION

The study was carried out among telephone operators in a telecommunication centre in Kuala Lumpur. Since the workforce consisted of mostly females, male operators were excluded from the study. Furthermore, there are studies quoting females at higher risk to develop WRULD when compared to males (Feuerstein & Harrington 2006). In this study, prevalence of WRULD was 48%. A previous study by Premlatha (1995) has also shown that female telecommunication workers have a prevalence of WRULD of 41.8%. The high prevalence of WRULD in females may be due to ergonomic factors at the work station which were originally designed based on male anthropometric data (Ulin 1993). Other explanation for the high prevalence of WRULD was that women complained of pain more frequently when compared to men (Armstrong 1993).

The majority of subjects were Malay, thus, the effect of ethnicity on WRULD is neutralized. Findings of this study did not prove the presence of an association between known risk factors such as BMI and age with WRULD.

Contrary to the findings of this study, Bernard and Fine (1997) showed that age was associated with WRULD. This was due to the combination of degenerative diseases as age increases or natural physiological changes that occurred in tissues whereby any injury occurring will have more significant effect among the elderly compared to the younger people. This may be explained by the presence of survival bias or healthy worker effect whereby workers with health problems will leave the job earlier and those who are well will remain. Ohlsson et al. (1998) interviewed 76 ex-assembly operators who claimed that health condition was the reason for them to leave their job.

Factors such as overtime work, duration of employment in the present unit and in the telecommunication centre showed no association with WRULD. This could be due to the fact that sample size of the study might be small. Ching et al. (1993) found that there was no association between duration of employment and WRULD among fish processing industries but there was a significant dose-response relationship between the magnitude of risk factors and WRULD for those exposed to the risk factors. Fredrikson et al. (1999) carried out a cohort study and found out that there was an association between overtime work and prevalence of WRULD when age was matched. In this study, the risk factor of overtime work was found not to be significant in contributing towards WRULD since its introduction in the telecommunication centre before this study commenced.

Pregnancy and HRT intake have no association with WRULD. Comparisons could not be done due to the small number of pregnant subjects in this study. However, the study by Ching et al. (1993) found that those subjects taking HRT had a twofold risk of developing WRULD when compared to subjects not taking HRT. Considering that the age pool of subjects tended to be from a younger age group, intake of HRT is not common.

CONCLUSION

It could be concluded that WRULD is common among female telephone operators in the Directory Unit in the telecommunication centre. Pain and neuro-

logical symptoms occurred in almost 40% of the workers. Since none of the risk factors under study were associated with WRULD, an elaborate study with a case-control design is needed in order to match cases and enable researchers to control the effect of confounding factors. This will ensure identification of risk factors pertinent to WRULD in the Malaysian setting. These risk factors will be useful when developing intervention programmes. Appropriate training and guidelines are also required for easy information dissemination to ensure the safety and health of workers.

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