QUALITATIVE ASSESSMENT ON RELATIVE RISK FROM OCCUPATIONAL HAZARDS ASSOCIATED WITH FISHNET PRODUCTION AMONG HOME WORKERS

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Abstract

This survey research aimed to identify the potential hazards and determine the relative risk on exposure to occupational hazards in fishnet home workers by a case study in Khon Kaen province, Thailand. Home-based process of the fishnet production were classified into three types: material handling (n=42), sinker made of lead attachment (n=42), and float attachment (n=42). Data were collected with a structured questionnaire, a survey form, and observations. The potential hazards were identified and risk was characterized by considering of 3 x 3 risk matrix (likelihood x severity). The final score indicated risk in five ranking levels. Ergonomic factors were identified at the high risk for the highest proportion of workers involved in the process of material handling, sinker attachment and float attachment for 54%, 57%, and 66%, respectively. The following factor was sharp instruments or materials identified the highest proportion of 24%, 21%, and 8% for material handling, sinker attachment, and float attachment, respectively. Chemical (lead) contamination through skin identified in process of material handling (22%) and sinker attachment (10%) at high risk. Personal protective equipment (PPE) was used by 10% of workers. Therefore, fishnet home workers should be aware of occupational hazards, by using PPE for better protection. The support of trainings on occupational safety and health, and PPE are suggested for the employers in compliance with the home workers protection act 2010.

Keywords: Home Workers / Fishnet / Ergonomics / Risk Assessment / Hazards

1. Introduction

Thailand is classified as industrially developing countries, and a major part of Thai products are from small business enterprise and informal economy. Informal workers occupied a high percentage as over 60% of total Thai workforce. The informal worker is defined as workers who are not under employment system, in another word is they had no employers. Health service is not available but under volunteer for own payment of having health insurance. earning money by their pieces private working some service and health service for more than home-based production. The majority of Thai workforces is informal sector worker, included home workers. In 2011, there were 24.6 million informal workers of total Thai workforce 39.3 million(1). It is found that home working and home-based production have long been practiced in Thai society. Female home workers outnumber male home workers in a significant proportion of 76.3% to 23.7%. Textile manufacturing locates overall in Khon Kaen province, Thailand. Fishnet is one type of the textile industry which provide home based product to the community near the factory. Home workers, therefore, are able to complete some part of fishnet and send back to the manufacturing. Workers normally transport material home and work with their own instruments and own workplace under home conditions.

In terms of occupational health and safety, a number of jobs undertaken by home-based workers are the potential sources of health hazards to workers and family members. For example, the problem of dust in ready-made clothing/ textile industries, the problem of hazardous chemicals in traditional clothing/textile making, and the problem with noise, heat, vibration in metal-related industry. Occupational health problems and potential health risk found in home workers are usually high because most of them work without any appropriate protective equipment or safety measures(2). It was also found that occupational health problem exists among family members who share the workplace(3). In September 2010, Parliament ratified the home workers protection act 2010, which came into effect in May 2011. This law provides for protection of wages, including equal pay for men and women doing the same job, occupational health and safety, responsibility of employers toward home workers(4). However, health risks on work hazards exposures continuously increase among home workers and their family members upon workplace conditions and the prevention. Fishnet is one type of the textile industry and the major income of home workers in Banthum municipality, Khon Kaen province, Thailand. This case study aimed to determine the health risk on exposures to identified health hazards in home based workplace by health risk assessment process among home workers involved in the fishnet product.

2. Materials and methods

Subjects and tools

The study was the cross-sectional survey study. Data were collected by an in-depth interview with the health risk survey form and observations at workplaces. Subjects (N=126) were workers involved in the process of the fishnet product in Banthum municipality, Khon Kaen province, Thailand. They were classified into three groups: material handling (n=42), Sinker made of lead attachment (n=42), and float attachment (n=42). Data were collected by the interviews with structure questionnaires applied from risk survey form and observations. The questionnaire consisted of five part; part 1: the demographic characteristics including age, gender, weight, height, part 2: the stress test with 20 questions, part 3: job characteristics: i.e. work experience (year), work time, work hour/day, total work hours for each fishnet and part 4: hazard identifications from the main task from 3 processes (material handling, lead attachment, and float attachment) and using personal protective equipment (PPE), part 5: Occupational Health services and training and experience on adverse health effect i.e. illness, injuries, health care seeking, annual medical examination, special medical examination in the risk group, training, waste management, biological and environmental monitoring by the health care center or public health related sector.

Potential hazard identification and assessment of relative risk

Potential hazards identified by an interview and observation were classified into six groups which might cause illness, adverse health effects or injuries and

diseases of home fishnet workers. Five groups of hazards were: 1) chemical hazards i.e. lead; 2) ergonomic factors i.e. repetitive work, prolong sitting, awkward posture, heavy lifting; 3) physical hazards i.e. insufficient illumination, sharp materials and tools and 4) biological hazards i.e. microbial infection and 5) stress. The qualitative risk assessment on exposure to occupational hazards was performed by considering the working procedures of each process, and possible work hazards were identified in each procedure.

Risk was characterized by considering the 3x3 risk matrix of likelihood ranking of hazards exposure and severity ranking of its consequence). The potential risk was calculated by the following formula for the final score:

Risk = Likelihood level x Severity level.

There were three ranking levels of likelihood to hazards exposure 1) unlikely: good control 2) likely: incomplete control and 3) highly likely: no control, high incidence report. There were three ranking levels of the severity of the subsequence adverse effect: 1) minor: near miss to first aid 2) moderate: hospital or temporary loss of work ability 3) serious: sick leave >3 days, chronic disease or permanent disability. The final score identified level of risk ranking as the follows; 1) low risk: score of 1; 2) acceptable risk: score of 2; 3) medium risk: score of 3-4; 4) high risk: score of 6 and 5) unacceptable risk: score of 9. Data were analysed by using of STATA version 10.0. Descriptive statistic was used to describe parameter: mean, standard deviation, min and max. Percentage was calculated for the proportion of home workers at the high risk level characterization.

3. Results

Fishnet producing process of home-based working

The process of fishnet home based production at Khon Kaen province were classified into 3 processes. Home workers involved in process of material handling/lifting, lead attachment, and float attachment. For material handling, workers had manual handling and lifting of materials without the lift or the hoist. The sack or pack of materials had the weights between 31 to 60 kilograms (kg) depending on which kind of material. The maximum load (60 kg) was package of lead metals using in process of lead attachment. Handcart was found to be used in the long way transportation with more than one sack. However, workers usually carry or lift one sack of materials or products by their own physical effort. In process of lead attachment the worker cut lead metal into small pieces and well attached to the nylon at the end of fishnet. The pieces of synthetic black foam were tied with the nylon to the fishnet in the process of float attachment. The necessary instruments for working of home-based fishnet were the scissors for cutting and the serration for best fitting of sinker made of lead to the fishnet. The process of lead and float attachment are shown in Figure 1.

Figure 1 The main processes of fishnet home based production are lead attachment process (left) and float attachment process (right).

Hazards identification and health risk assessment

By health risk assessment process, hazards were identified for three working processes and filled in the risk assessment form after adjustment the likelihood of health impacts and the severity of its consequence. This study found that the same groups of hazards had been identified at high risk level in three processes which were ergonomic factors, the chemical (lead) poisoning, and accidents caused by instruments or materials, insufficient illumination and the stress. An example of hazard identification and the severity adjustment in the process of lead attachment to the fishnet is shown in Table 1. Accidents at work were reported from several workplaces in Thailand leading to the loss of products and decreases of work ability because of injuries or handicap among Thai workforces. This study, therefore, considered an accident caused by materials, tools or any environmental agents as one type of the work hazard among the fishnet home workers.

Workers involved in material handling had the highest proportion of relative risk caused by ergonomic factors: awkward postures and heavy lifting (54%), followed

by materials falling caused injuries (24%) and chemical (lead contamination) (22%) as shown in Figure 2. Workers of sinker attachment also had the highest proportion of health risk caused by ergonomic factors: awkward working posture and prolonged sitting (57%), followed by inappropriate tools caused injuries (21%), and lead by skin contact (10%) as shown in Figure 3. Workers of float attachment also had the highest proportion of high risk caused by ergonomic factors: awkward working posture and repetitive work (66%), followed by work stress (15%) and insufficient illumination (14%) as shown in Figure 4.

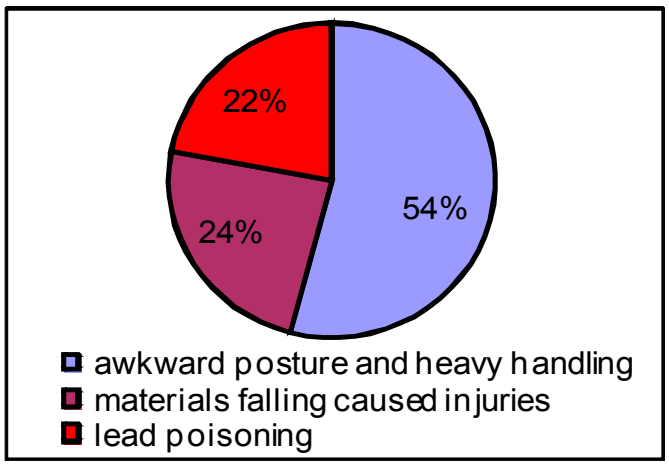

Figure 2 Hazard identification at the high risk level among home workers in the process of material handling/lifting (n=42).

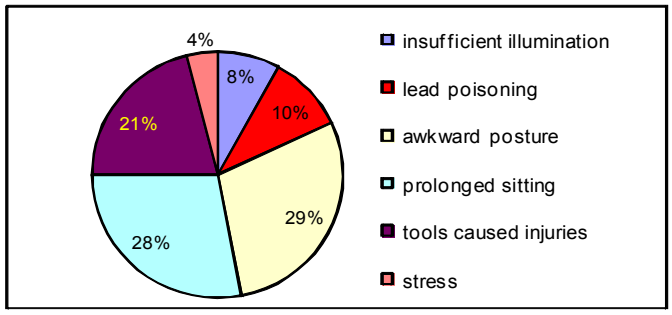

Figure 3 Hazards identification at the high risk level among home workers in the process of sinker (lead) attachment (n=42).

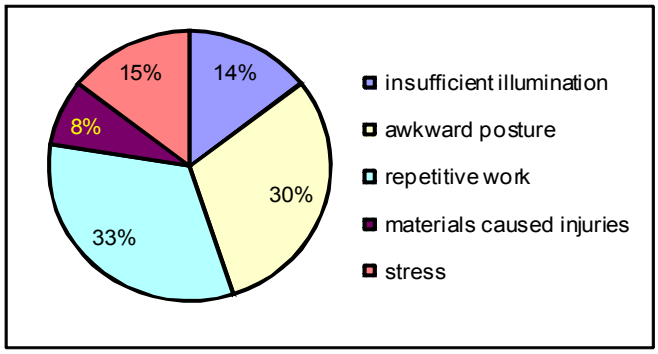

Figure 4 Health hazards identification at the high risk level among home workers in the process of float attachment (n=42)

4. Discussion

From three processes, results showed the same direction that ergonomic factors were identified as the number one of health hazards to fishnet home workers in this study. One explanation is that the workstation of the home worker in this study was not difference from home conditions, and workers actually moved the materials and fishnet holding to anywhere they want. Therefore, awkward postures during working without backrest of seat and no chair seat were observed. The worker needed at least one hour for lead/float attachment to one sheet of the fishnet. When the workers need more than one product (10 bahts/ sheet of fishnet), prolonged sitting for producing normal occurred every day and every night. This behavior therefore caused the musculoskeletal disorders (MSDs) among home workers as reported symptoms in this study and previous studies(5-7). Moreover, the workers must transport the heavy materials home with maximum load of 60 kg for lead package or less for the nylon or other material and the finished products. Overload lifting and pulling cause low back pain, particularly lifting with the wrong posture and also against the standard regulation(8).

One identified hazard that caused the high potential health risk to fishnet workers was chemical exposure. Lead exposure, either by skin contact during handling material and lead attachment procedure, or by ingestion because biting the lead metal instead of using the serration was found as unsafe behavior for protection. Lead poisoning will not present in short term at low dose exposure, however, long-term exposures to lead cause malfunction

of peripheral nervous system leading to weakness of upper limbs so called wrist drop syndrome, and also affecting the lower limbs, and other kinds of chronic adverse health effects(9). Home workers also reported the stress which might affect their quality of life and might play indirect role to provoke MSDs symptoms, particularly in aging worker(10, 11). Insufficient lighting intensity at workstation was the risk condition found in this study. This kind of workstation requires at least 300 lux for the minimum working illuminance under Thai regulation(12). Insufficient can damage workers visions in long term exposure and lighting was included as one factor that plays important role on MSDs(13).

Moreover, high risk level from accidents caused by materials or tools was found in every process. Working without any appropriate protective equipment or safety measures caused injuries as found by another study(2). Under home workers protection act 2010(4), the small entrepreneur who act either directly or through an agent as a sub-contractor, or the hirer must provide an appropriate and sufficient PPE to home workers. However, this study found that there were less than 10% of workers had or used the PPE while working.

Figure 5 shows the issues of occupational safety and health services. The training of safety at work (31%) and using PPE (7.1%) were less promoted to home workers compared to other issues. The highest promotion to home workers was biological monitoring by blood sampling (50.2%). Blood sample was collected to evaluate lead exposure by the reason of research project from external institute, not from the health sector in community. In addition, the biological monitoring was from the screening program of pesticide exposure because workers were also agriculturist. Although, annual medical examination stood on the second place of health services compared to all issues, 43.0% cannot present the good promotion for health service among workers.

5. Conclusions and suggestions

This study identifies that fishnet home workers had high potential health risk on exposures to ergonomic factors as a number one hazards which were awkward posture, heavy lifting and prolonged sitting work. The second hazard with high potential risk to worker heath was chemical exposure, or lead poisoning, exposed through the skin contact during handling and lead attachment process. Lead ingestion was one pathway of exposure because of unsafe behavior by biting instead of using the serration during attachment lead to the fishnet. Home workers also reported

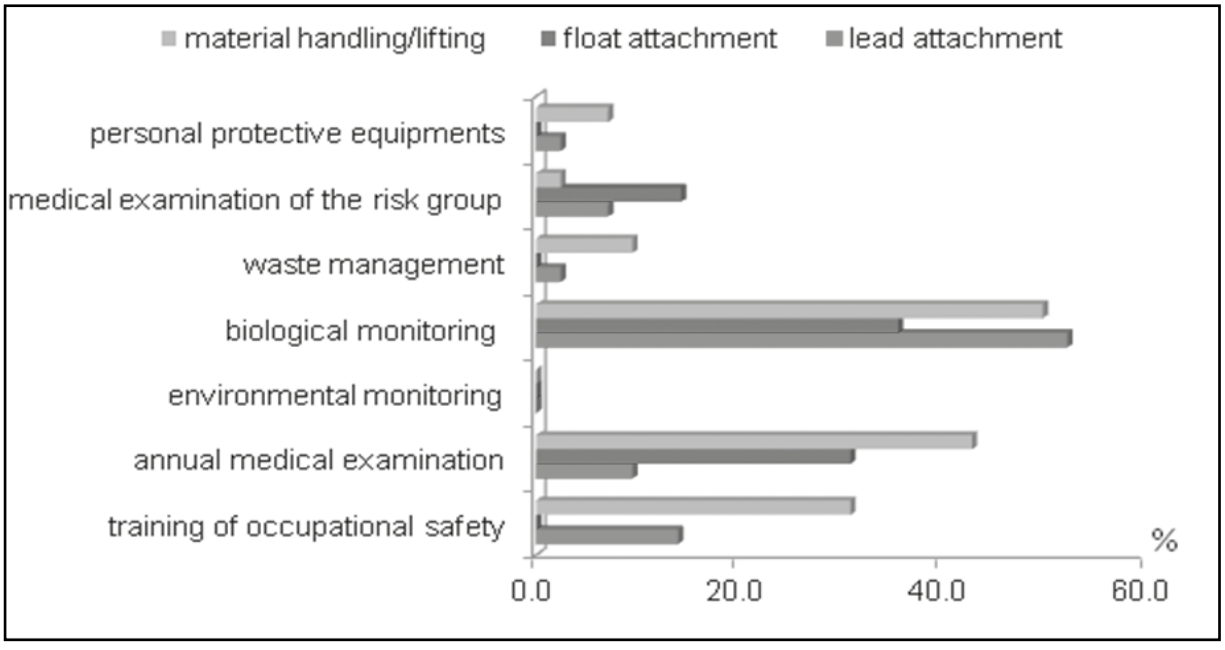

Figure 5 The issues of occupational safety and health service provided to fishnet home workers in the process of material handling (n=42), float attachment (n=42) and sinker (lead) attachment (n=42).

the psychosocial work factors which affect their quality of life and indirectly effect to the provoking symptom of MSDs.

Moreover, there were risk levels from accidents caused by working without any appropriate PPE or safety measures. Injuries can also be caused by inappropriate tools and materials. This study found that there were less than 10% of workers had or used the PPE during working. Insufficient lighting intensity was the hazard condition identified for health risk. Therefore, home workers should be aware of occupational hazards affecting adverse health effect both in short term and long term. There should be a training of work safety and the health surveillance among home workers for safe working and living of family members. The local public health sector should follow-up and coverage all home workers to access the universal health care service. Moreover, the employers or the hirer must follow the labor protection act of Thailand for home workers. The issues of providing an appropriate PPE and the cost of medical treatment for illness and injuries caused by work are under responsibilities of the hirer or contract employer.

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References

1. National Statistical Office, Thailand. The report of informal employment survey. Bangkok: Ministry of information and communication technology; 2011.

2. Homenet. Homeworkers in Thailand: A Study on Their Legal Problems, Available at: http://caw.jinbo.net/popups/articleswindow.php?id=44, accessed August 31, 2011.

3. Laungaramsri P. Home workers in Thailand: an assessment. A paper submitted to the Friedrich-Ebert-Stiftung. Chiang mai: Chiangmai University, 2005.

4. The ministry of Labour. Home workers protection act 2010. Available at http://thailaws.com/body_thaiacts_a03.htm, accessed August 31, 2012.

5. Chaiklieng S and Homsombat T. Ergonomic risk assessment by RULA among informal sector workers of Rom Suk broom weaving. Srinagarind Med. J. 2011; 26:9-14.

6. Bernard BP. Musculoskeletal disorders and workplace factors. A critical review of epidemiological evidence for work-related musculoskeletal disorders of the neck, upper extremity and low back. USA: Department of health and human services (NIOSH); 1997.

7. Sungkhabut W and Chaiklieng S. Musculoskeletal disorders among informal sector workers of hand-operated rebar bender: a pilot study. Srinagarind Med. J. 2011; 26(3): 45-50.

8. Chaiklieng S. Work-related back pain. *KKU Journal of Public Health Research* 2009; 2(3):49-58.

9. Chaiklieng S. Industrial toxicology. Khon Kaen: Khon Kaen University printing, Thailand, 2002.

10. Haynes S and Williams K. Socio-economic differences in the prevalence of acute, chronic and disabling chronic pain among ageing employees. Pain 2008; 114, 364–71.

11. Linton SJ. A review of psychosocial risk factors in back and neck pain. *Spine* 2000; 25, 1148-56.

12. Department of Labor Protection and Welfare, Ministry of Labor, Thailand. Regulation on the standard of management of safety, occupational health and work environment; heat, light and sound, version 2006. Available at http://www.labour.go.th/law/index.htm, accessed March 20, 2010.

13. Chaiklieng S, Suggaravetsiri P, Boonprakob Y. Work ergonomic hazards for musculoskeletal pain among university office workers. Walailak J Sci & Tech. 2010; 7(2), 169-76.