

THE EFFECT OF BODY MASS ON VIBRATION TRANSMISSION IN HAND ARM SYSTEM

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Abstract

The basic cause of severe hand vibration syndromes are the tools and processes in Industry, agriculture, mining and construction where the hands and fingers grasp and push vibration objects (Griffin, 2004). A wide range of devices such as hand drill machine, hand grinders, road chippers, and stone cutters etc. generate vibration which may produce health related disorders. The vibrations transmitted to hand and arm may cause vascular disorders, bone and joint disorders, peripheral neurological disorders, muscle disorders etc. Several researches have been carried out to investigate the effect of these vibrations.

In the present study, the vibration levels were recorded for stone grinding tasks for nine subjects. The recordings were made at the surfaces of contact of fingers and handle of the grinder and also on the wrist level.

The results showed that there was significant decrease in the vibration levels found at the wrist compared to the surface of contact of fingers. That showed a good amount of absorption of vibrations between wrist and fingers. A particular phenomenon was also observed regarding the body mass of the subjects and vibration levels found. The statistical analyses showed that there was significant correlation (Pearson Correlation = 0.978 at $p < 0.001$) between the body mass of the subjects using hand held vibratory tool and the vibration levels recorded at the fingers contact surfaces.

Keywords: vibration, grinding task, drill machine, neurological disorders

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STUDY OF ERGONOMICS IN COMPUTER WORKSTATIONS

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Abstract

An ergonomic workstation design is provided, incorporating an integrated flat screen monitor. Desirably, the monitor can be horizontally translated along tracks to adjust the relative position of the monitor for comfortable viewing.

Furthermore, the disclosed flat screen monitor can be folded into a closed position where the viewing area is protected and the workstation is made more compact, while the desk area is clean and uncluttered. Moreover, compartments are provided for conveniently storing input devices such as keyboards when the workstation is not in use.

Finally, the workstation is designed on several levels with hinged compartments openable for convenient service access.

Keywords: ergonomics, workstation, flat screen monitor

MUSCULOSKELETAL DISORDERS AMONG CARPENTERS

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Abstract

Aim: The present study aimed to determine the prevalence for work related musculoskeletal disorders among carpenters involved in residential furniture making.

Methods: Data were collected using a questionnaire on musculoskeletal symptoms, work history and personal information from sixty-nine male carpenters between the ages of 25 and 59 years. The questionnaire assessed the presence of musculoskeletal trouble in different body regions during the time of enquiry.

Results: Nearly half of the carpenters (48%) declared about the presence of musculoskeletal symptoms in at least one body region. Body regions with highest prevalence of musculoskeletal disorder during the last twelve months preceding the study were lower back (27.5%), knee (23%), forearm/wrist (13%) and neck (10%) and for all workers. The prevalence rate was significantly higher among the age group above 40 years (64%). Job satisfaction scores were closely associated with the MSD prevalence; a low job satisfaction was associated with a high incidence of musculoskeletal symptoms.

Conclusion: It appeared that activities in carpentry might be highly demanding with respect to postural load imposed on low back, knee and neck. The body regions affected were those that have been expected from posture and movement analysis in different tasks as reported in earlier studies.

Key words: Carpentry works, Musculoskeletal disorder, postures, job satisfaction

HEALTH HAZARDS RELATED TO COMPUTER USAGE

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Abstract

The increasing use of computers is undoubtedly a positive sign of our development but has grey areas, too. Along with our increased reliance on computer, comes a new health risk- in the form of repetitive strain injuries, occupation overuse syndrome, cumulative trauma disorders, general muscle strain and vision problems associated with its usage.

A study was undertaken in Hisar district of Haryana state on 200 computer users selected randomly from four public and four private organisations each. Respondents between 25-40 years of age using computer atleast for the last one year and minimum 4-6 hours daily comprised the sample. The study aimed to determine musculoskeletal discomfort in different body parts and vision related problems due to computer use.

Majority of the respondents from both the sectors were male (73.0%) and were doing data entry. Average time spent by computer users was 6-8 hrs daily and that too, on improper workstation. Majority of the respondents (85%) reported musculoskeletal problems as they were working longer on computer at a stretch. The magnitude of pain was highest in neck (79.5%) and lower back (72.5%). Reasons mentioned for pain in different body parts were holding same position for lower back (83.3%), prolonged sitting in poor posture (61.7%), and watching screen at stretch (51.1%). Further burning eyes (mean score 2.6), eye strain (MS 1.9), dull eyes (MS 1.7) and eye watering (MS 1.5) were the main vision related problems.

Suggestions for ergonomically suitable cost-effective workstation were given to reduce the musculoskeletal and vision related problems.

Keywords: Musculoskeletal problems, vision related problems

ASSESSING THE ERGONOMIC HAZARDS FOR PILEDRIVERS

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Abstract

The study was conducted to assess the physical/ergonomic exposures that may lead to musculoskeletal injuries of piledrivers.

A hierarchical taxonomy for piledriving work was developed with tasks and activities defined within each of eight main pile driving operations. Exposures were characterized for the piledriving work with the PATH (Posture, Activity, Tools, and Handling) work-sampling observation method. Data on working posture were collected for three main body parts: legs, arm and trunk. Data on activity performed, tools used and loads handled were also collected for each observation.

A total of 8301 observations were made on 29 piledrivers, on a total number of 6 work sites. The lagging operation had the highest percentage of observations with non-neutral trunk (46.8%), and leg (41.0%) postures, as well as one of the lowest percentages for working on stable ground (9.0%) as observed during the lagging operation. The bracing operation had the lowest percentage for working on stable ground (0.3%). The slurry wall operation also had a low percentage of work on stable ground (6.0%). The arm postures were less frequently non-neutral. Manual material handling (MMH) activities (lifting, lowering, carrying, moving and pushing/pulling) were observed less frequently in any of the operations.

The results indicate that significant exposures exist that could lead to musculoskeletal injuries of the back and legs for the piledrivers. The results from the study could help target specific hazardous tasks and design ergonomic interventions for those tasks.

Keywords: ergonomic hazards, piledriving, MSDs, construction

INCIDENCE OF MUSCULOSKELETAL DISORDERS AND PERCEIVED QUALITY OF LIFE IN CONSTRUCTION WORKERS IN MUMBAI

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Abstract

The use of machinery and power tools, work on elevated scaffoldings, manual material handling, all contribute to making construction work as one of the most hazardous and injury-prone industry. Moreover, the labors often operate in asymmetric work postures which make them susceptible to accidents and developing musculoskeletal disorders.

A pilot study was conducted to ascertain and quantify the prevalence of musculoskeletal disorders amongst the construction workers and explore the perceived quality of life in them. The study was conducted on 34 male construction workers (mean age 23.8 yrs), involved in various activities related to construction. The average work duration was 9.54 h per day and 58.15 h per week. Musculoskeletal disorders were assessed by administering Nordic Musculoskeletal Questionnaire. The quality of life was computed using the World Health Organization's "Quality of Life Questionnaire" [WHOQOL-BRIEF], which assesses four domains, viz., physical health, psychological domain, social relationship, and environment respectively.

The result showed that the incidence of low back pain and discomfort was the most reported (41.17%) complaint, followed by those of wrist and hand (26.47%). 23.52% were precluded from carrying out physical activities due to lower back problems and 35.29% attributed this to their work. The mean scores in the four domains of QOL was highest for the social relationship domain, followed by psychological domain, physical health and the environment domain, in descending order.

The study also revealed certain important aspects pertaining to health and wellness in this workgroup which will be discussed in the full paper and during the presentation.

Keywords: construction worker, quality of life, musculoskeletal disorder

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ERGONOMICS AND THE HEALTH CARE PROFESSIONAL

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Abstract

Ergonomics is an inalienable part of engineering. Health care expertise is essential in this area in order to keep design up to date with demographics, patterns of dysfunction etc. Merely copying design from other countries is ineffective and inadequate.

Ergonomists trained in health care especially rehabilitative sciences can also be effective in identifying and correcting unsuitable work postures caused either by man-machine misfit or poor work hygiene. Education is of primary importance in these cases and these professionals can be effective in this area as well.

Analysis of human factors, interaction with employers and engineers, prevention and treatment of minor discomforts so that they don't magnify; minor adjustments in work areas and job performance, evaluation of person in the work perspective are the roles that these professionals can fill in a nutshell.

In this scenario, we need to Increase awareness through media, more ergonomist presence in industry, conduct ourselves with professionalism, develop India specific objective evaluations. A cadre of professionals must be created- ISE could have a certification exam with internship in industries so that we have greater exposure, accountability and a measure of stature as professionals.

Keywords: Physiotherapists, work related musculoskeletal dysfunction, work hygiene

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ERGONOMICAL STUDY OF RURAL HOUSING THRESHOLD IN RELATION TO SAFETY HAZARDS

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Abstract

Randomly selected 50 household and rural women were studied. The anthropometric parameters, door threshold dimensions were recorded. Physical problems and safety hazards were gathered.

Correlation of anthropometric measurements with door and threshold dimensions revealed that as the height of the respondent increased the physical problems like pain in elbow, pain in back, knee and neck also increased. With increase in weight of respondent the physical problems also increased.

Significant correlation was noted for overweight and pain in knee (0.901**). Significant correlation was noted for pain in shoulder (0.879**) and deltoid circumference of 99 cm and above. The door height, door width, threshold height and threshold width are related with physical problem due to these door dimensions. Increase in height, weight, deltoid circumference and span akimbo resulted in significance increase in pain in back, neck, knee and shoulder and elbow joint.

Keywords: Threshold, Safety hazards, Anthropometry

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SCHOOL BACKPACK WEIGHT AND ITS IMPACT ON ADOLESCENT SCHOOL STUDENTS IN NORTH TRIPURA.

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Abstract

A number of studies have reported that musculoskeletal pain is associated with schoolbag weight. A general guideline of 10% of body weight (Voll and Klimt-1977) continues to be recommended guidelines when carrying a backpack style schoolbag.

The aim of this study was to investigate the weight of adolescent school student's schoolbags and the subjective perception of their daily backpack loads and the effects of schoolbag load on adolescent school children's of different socioeconomic background in northern part of Tripura.

A total number of forty-five students of the age group 13-14 years volunteered for the study. A modified Nordic Questionnaire was administered to record data on type of schoolbag used; method of carriage, time spent carrying the bag, any discomfort experienced due to schoolbag carriage and also modalities of buying the schoolbag. Daily discomfort was recorded in a body discomfort chart.

Musculoskeletal symptoms were reported by 31 students (69 %) of which 18 were from MIG (82%) and 13 from HIG (57%). It was found that most of the children are carrying loads in excess of 10% of their body weights. Also students from lower socio economic background are at high risk of developing musculoskeletal symptoms.

Key Words: School backpack weight, musculoskeletal pain, school students.

AN ANN BASED SYSTEM TO REDUCE OCCUPATIONAL HEALTH HAZARDS WITH JOB-COMBINATION APPROACH

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Abstract

In this paper we present an artificial neural network (ANN) based novel system to reduce occupational health hazards (OHHs) of workers of a labor intensive industry – Glass-bangles manufacturing units at Firozabad, India. Glass-bangles manufacturing consists of four jobs namely *tarwala* job, bangles rolling, making *gundhi* and finishing (*tarwala*, and *gundhi* are local terms). *Tarwala* job is the best paid job but the most tedious one, and perceptibly more prone to health hazards. Due to socio-economic reasons workers wish to earn as much as possible even by subjecting themselves to extreme work conditions. A job-combination approach is proposed to lessen the effects of job severity by suitably allocating workers' timings in two jobs. Each of the three job combinations has a *tarwala* job along with one of the three other jobs.

We evaluate OHHs for a job combination based on the rate of perceived exertion (RPE) on a scale of 0 to 100 – RPE is determined by working hours (WH), duration of rest breaks (RB), and number of rest breaks (NoRB). Since it is extremely difficult to evaluate RPE for every possible combination of WH, RB, & NoRB of two jobs under consideration, therefore ANNs with backpropagation learning are used. Three ANNs are trained, one for each job combination, with known data set. Each trained network facilitates the estimation of RPE/OHHs for inputted values of WH, RB, & NoRB of job-combination under consideration.

The proposed intelligent system would act as an advisor to choose a job combination and the corresponding values of WH, RB, & NoRB so that the worker is within the prescribed safe limit of OHHs without much compromise in his/her earnings.

Keywords: Glass-bangles manufacturing, *tarwala*, artificial neural network, occupational health hazards, rate of perceived exertion

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**ERGONOMIC ASSESSMENT AND FUNCTIONAL REDESIGNING OF 'SANKHEDA'
SOFA AND SOFA CHAIR**Suramya Joshi, Niyati Walter, Shreya Shah

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Abstract

A house becomes home, when it enables its members to achieve physiological and psychological needs. The furniture in the home is the expression of the family members' life style and it is often chosen according to the theme of the room. Sankheda Furniture named after the geographical place of its manufacturing - a town in Gujarat State, is one of the most 'artistically made' wooden living room furniture for seating. The present study was undertaken with the objectives as, to study the construction features of Sankheda sofa and sofa chair from ergonomic point of view, to get the opinion of its users and the extent of comfort / discomfort with its use, to collect the required anthropometric data, data on the sitting habits and health history of the respondents and to identify the scope for modification in the design of the furniture objects in question from functional point of view.

Those using Sankheda Sofa and Sofa chairs in their living room for minimum 3 years who were 18 years and above in age and with no physical and mental abnormalities were selected purposively as samples. Subjective data were obtained through questionnaire and observation sheet and objective data were gathered using plastic measuring tape, weighing scale and protractor.

Out of the total sample, the investigator identified 35 respondents having higher extent of physical discomfort with this furniture. They were belonging to 3 body types namely 1. average height and average weight (n=09), 2. more height and average weight (n=09) and 3. less height and more weight (n=17). Based on the suggestions given by these respondents for the functional modifications and keeping the 5th and 95th percentile of anthropometric measurements as per its relevance, the following changes in the dimensions of Sankheda Sofa and Sofa chair were suggested and the 3-D view of new design were presented. For body types first and 3rd the revised dimensions were, seat height reduced, seat breadth, backrest breadth, Arm rest breadth, arm rest height, cushion thickness, mattress thickness and backrest angle to be increased. Whereas for body type two, it were, backrest height, armrest breadth, armrest height and backrest angle to be increased.

Keywords :Functional redesigning, body types, extent of physical comfort, Sankheda furniture