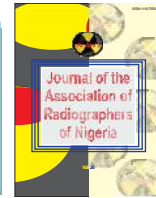




Contents lists available at

Journal of Association of Radiographers of Nigeria

Journal homepage: www.jarn-xray.org



A study of the Ergonomics of the Medical Imaging Scientist in South-South, Nigeria.

NO Egbe, GB Inah¹, WE Azogor, NO Chiaghanam, EV Ukpong, SB Echemi, C Nzotta²

Department of Radiography & Radiological Science, University of Calabar, Nigeria

¹*Department of Radiology, University of Calabar Teaching Hospital, Calabar.*

²*Department of Radiography & Radiological Sciences, Nnamdi Azikiwe University, Awka,*

Correspondence:

nneoyiegbe@unical.edu.ng

ARTICLE INFO

Article history

Received December 10, 2011;

Revised March 2, 2012;

Accepted April 5, 2012;

Available online, 2012

Keywords:

Imaging Scientist,
Ergonomics, job
satisfaction, Health
and safety,
performance,
perception

Abstract

Background: The dynamics of man's relationship to his work environment have a lot to do with the productivity, output and results obtainable.

Objective: This study sought to determine for the first time, to establish the perception of the Medical Imaging Scientist of the ergonomic variables of Job satisfaction (JS), Health & Safety (HS) and Performance (P) in Radiology Departments in South-South region of Nigeria.

Materials and Method: A prospective survey with 100 self completion questionnaires was conducted among Radiographers (65) and Radiologists (35) in the South-South Nigeria. No stratification was observed among the professionals. Questions sought responses in a scale of 1-5 (with 5 being best positive response) relating to job satisfaction, health and safety issues and performance of personnel. Simple percentages were used to organize the results obtained and deductions made accordingly. A two sample t-statistic was used to determine any differences between the perceptions for good against bad ergonomics at the 95% confidence interval. The Pearson's linear correlation coefficient was used to determine any relationships between the three ergonomic parameters. Responses included indication of musculoskeletal conditions which respondents had suffered from work.

Results: Information obtained from responses revealed that about 29% of respondents were satisfied with their jobs. At least 44% of respondents felt there was sufficient provision for their health and safety at work, while about 41% rated their performance as being good on a scale of Excellent > Good > Fair > Poor. Strong positive linear relationships ($r = 0.8$) were found between the three parameters but none of these was statistically significant ($p > 0.05$).

Conclusion: The results suggest that factors other than health and safety may be determinants of the imaging scientists' job satisfaction and performance.

copyright@2012 jarn-xray

INTRODUCTION

The need to optimize the production and output in the delivery of goods and services places a demand on the work environment. Ergonomics is the science that relates man and his work comprising the anatomic, physiologic and mechanical principles which affect the efficient use of human energy in a work environment¹. It is concerned with the interaction between the worker and the job and could be defined as the application of human science to the optimization of the working environment². It allows for the study of the interaction between the worker and his job, with the goal of creating greater efficiency with more comfort for the worker.

Ergonomic studies are important in every work environment because it takes into cognizance the design of the work rooms and it puts in place various factors depending on the job description in order to ensure, health and safety, utmost performance and job satisfaction. The value of ergonomics is easily understood by anyone who has tried to do a job using wrong or inefficient tools. The increased difficulty causes the job to take longer, leading to frustration and job dissatisfaction. This in turn leads to use of excessive force and increases the risk of accidents².

The Medical imaging scientist is defined in this study to include the Radiologist and diagnostic Radiographers. Medical imaging employs the use of both ionizing and non ionizing radiation for diagnostic purpose. The use of heavy equipment is

also characteristic of this field of medicine. The medical imaging scientist is concerned with maneuvering such equipment to obtain required results. These place some physical demand on the users, which is one reason for carrying out ergonomic studies among this category of workers. Lack of information on this phenomenon could adversely affect radiological service delivery due to the possibility of disillusioned, and stressed out employees leading to incidences like accidents, low productivity, high repeat rates in procedures, mistakes with sorting of radiographs as a result of inability to manage the ensuing pressure from increased work load³.

There appears to be a paucity of studies on the ergonomics of the medical imaging scientists. However, studies in related medical and allied fields have demonstrated the essence of ergonomics in the working environment. A study by Kirkcaldy et al.⁴ reported that gender, marital status, parenthood and length of employment were the variables most clearly associated with occupational stress and job satisfaction among medical workers.

MATERIALS AND METHOD

A total of 100 self completion open ended questionnaires were distributed to medical imaging personnel (Radiographers and Radiologist) covering Teaching hospitals, General/Specialists hospitals and private clinics with imaging services in the south-south region of Nigeria. In all, 65

questionnaires were administered to Radiographers and 35 to Radiologists. The experience of respondents is shown in Figure 1. The questionnaire contained 31 questions, in three sections of JS (9), H &S (11) and Performance (11), designed to extract factual information on the ergonomic themes studied. The questions under the Job satisfaction (JS) theme were designed to review the scientists' perception of his job, and to demonstrate the degree of worker fulfillment. Health and Safety (HS) questions focused on the workers'

perception of provisions made towards ensuring health and safety in the work environment. Respondents were asked to indicate which musculo-skeletal disorders they had suffered from, drawing from a list of ergonomic disorders such as Cumulative trauma disorder (CTD), repetitive motion disorder (RMD), carpal tunnel syndrome (CTS), back pain (BP), joint pain (JP), headaches and dizziness (H & D). Questions under performance (P) sought to evaluate the Imaging Scientists' perception of performance at his job.

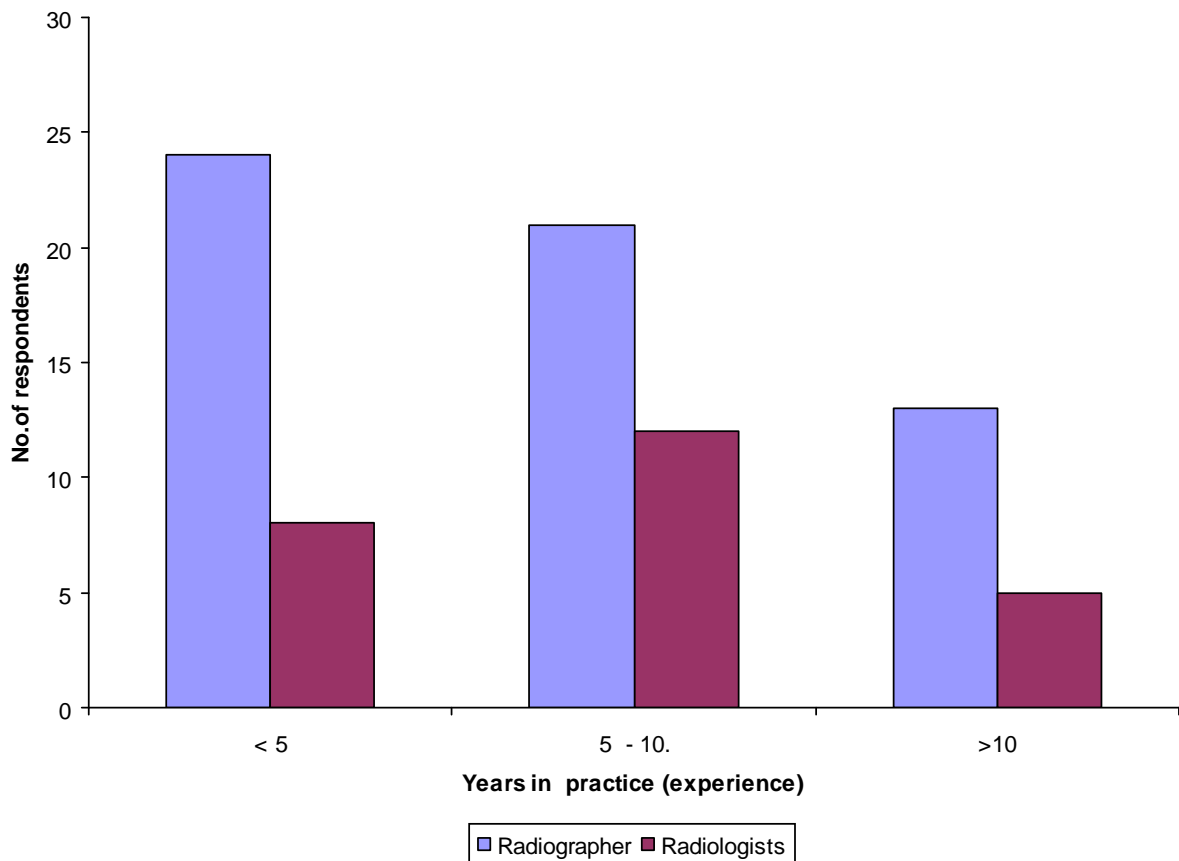


Figure 1: Work experience of respondents in the study

Respondents indicated by scoring on a scale of 1 – 5, where 5 was rated best conditions and 1 worst case scenario (5 – best/Excellent; 4 – Good; 3 – Fair; 2 – Bad; 1 – worst case). The scores showed their level of agreement with the issues raised. Data obtained from the responses was organized using simple percentages. Responses rated 3 and above were taken to imply good ergonomic performance while scores below 3 were rated as performing poorly. The difference between the responses which signified ‘good’ against responses for ‘poor’ ergonomics was tested statistically using a two-sample T-test at the 95% confidence interval. The Pearson’s linear correlation coefficient was used to assess the association between the studied ergonomic indicators - Job satisfaction (JS), Health and Safety (HS), and Performance (P) at the 95% confidence interval.

RESULTS

Of the 100 questionnaires distributed, 83 (83%) were received from the respondents. While 58 radiographers returned questionnaires, 25 Radiologists responded to the study. No stratification was observed in the study with respect to ranks of these professionals. The distribution of respondents by profession and the number of years they had worked is as shown in Figure 1.

Figure 2 represents the distribution of responses in the Job satisfaction ergonomic concept. Only 35% (of respondents) were satisfied with their jobs. More than half the number of

respondents indicated dissatisfaction, with nearly a third of these being strongly dissatisfied.

On issues related to performance Figure 3, 31% (strongly agree) and 19% (agree) of the respondents judged the Imaging Scientists’ performance at his job to be good (rated 4 or over in the scoring system adopted). Nearly the same number (47%) of respondents disagreed with this.

Health and Safety issues were rated good by 41% of respondents, while over 50% felt these issues were indicators of an unacceptable work environment (Figure 4). Overall assessment of ergonomics of the Imaging Scientists’ under Good and Poor is presented in Figure 5. The Pearson’s moment correlation between the three ergonomic parameters confirmed strong linear relationships between JS versus HS ($r = 0.80$), JS versus P ($r = 0.81$) and between HS versus P (0.86). All correlation values were found to be statistically insignificant ($p < 0.05$).

The distribution of respondents with respect to occurrence of MSDs is shown in Figure 6. Pain, in this study consisting of back pain and joint pains, account had an incidence among 35% of respondents. Headache and dizziness recorded a 29% incidence among the respondents. CTD (6%), RMD (16%) and CTS (14%) were also recorded in the population of Medical Imaging Scientists studied.

DISCUSSION

This study sought to examine the Imaging Scientists' assessment of three basic Ergonomics concepts of Job satisfaction, Health and Safety as well as Performance in the South-South geo-political zone of Nigeria. Information obtained from the responses to the questionnaire in this study showed that all respondents considered working in the Imaging Science sector as being very fulfilling, but disagreed with respect to issues like sufficient equipment for satisfactory practice, the work environment being conducive, sufficient staff for work load and the regularity and sufficiency of welfare packages/incentives. The worker's perception of his job and environment would to a large extent affect his performance/productivity. This is evident in the strong relationship between the ergonomic parameters.

Due to the lack of adequate personnel in the Radiology sector, there is a lot of strain on the available workforce, often leading to long hours of rest with little breaks, suggesting a possible compromise of the health/safety of the imaging scientist. Other factors like the age and type of equipment in the hospitals and a lack of a proper ergonomic design in place, may also adversely affect performance. Muscroft and Hicks⁵ report stress as a function of a lack of ergonomics. These reasons give weight to the current study. All respondents agreed to insufficient rest days and agreed that they had encountered at least 2 of the ergonomic disorders listed with 64% of the respondents complaining of Back pain,

Joint pain, Headaches and dizziness. Staffing issues have been reported to contribute to personnel stress⁶ and extended work hours aggravate moods, cause fatigue, job dissatisfaction and truancy⁷.

The responses relating to H &S may be a reflection of the level of awareness of relevant H&S issues by personnel in imaging departments. Most respondents who responded negatively to H&S considered issues like sizes of the ray rooms, distances traveled, availability of emergency incident plans for staff, regular cleaning of the departments, and availability of health insurance in reaching their conclusion. It may therefore seem that the 41% of respondents who were satisfied with H&S issues were concerned with the obvious electrical and radiation safety requirements for staff and patients. Responses reflect a strong concern for such safety issues as radiation and electrical safety, but almost none for the absence of safety protocols to cater for concerns in heavy lifting, equipment performance and safety tests, infection control measures and workload. This may probably account for the strong positive correlation ($r = 0.8, p < 0.05$) between H & S versus Job satisfaction. It is felt that a more comprehensive understanding of H&S issues would be achieved if all issues are integrated one way or the other into the work plan⁸ of the scientists.

At least half of the respondents gave pass marks (at least 4 of 5 available points) to the Imaging Scientist on

performance. Majority of the respondents believed that their performance was invaluable to the department. This is an indication of self belief and confidence in their professional ability. Although respondents acknowledged the occurrence of mistakes in the course of duty, these were few and far between. Major issues challenging performance include poor staff motivation, poor recognition and reward system, as well as management not being too 'change friendly'. In the midst of these, respondents agreed that they would spare nothing to achieve excellence at work.

The distribution of occurrence of MSDs among respondents is presented in Figure 6. The most wide spread MSD in the studied population was pain (back pain or joint pain) with at least 35% of respondents having had bouts of either. Headaches and dizziness had affected about 29% of the respondents in this study. Some studies⁹⁻¹¹ have shown that low back pain was the most common complaint among X-ray Technologists. These results have highlighted the need for a closer examination of the musculoskeletal issues in the different professionals. This is the subject of a review that is already on.

No studies were found to compare with the current results. However, a study investigating the incidence of occupational stress among radiographers in the South-Eastern Nigeria rated job satisfaction at 61.3% and anxiety levels at 45.3% and providing baseline stress level and prevalence among

radiographers¹². The current study focused on the principal professionals in the X-ray Department as is actually a first time study of this nature. It is probable that the study design and larger sample size may account for the lower rating of 35%.

CONCLUSION

Ergonomic parameters of Job satisfaction, Health and Safety as well as Performance of the Medical Imaging Scientist - Radiographers and Radiologists have been studied in the South –South Nigeria. The results reflect a significance difference between respondents rating ergonomics as good with those rating it as poor. Finding may be suggestive of the need to address ergonomic issues to harmonize practitioners' perception and therefore performance.

Acknowledgement:

The authors are grateful to all the Radiographers and Radiologists who took part in this study. No conflict of interest is declared by the authors.

REFERENCES

- Ballinger JM, Comello RJ, Veale B. Stressors that negatively affect the health of the Radiology professionals. *Journal of Medical Imaging and Radiation Sciences* 2008; 39:11 – 15.
- Gay K. *Ergonomics: making products and places fit people.* Enslo, 1986; 128p.

- Josten EJC, Ny-A-Tham JEE, Thiery H. Nursing and healthcare Management: the effects of extended workdays on fatigue, health, performance and satisfaction in Nursing. *Journal of Advance Nursing* 2003; 44 :643 – 652.
- Kirkcaldy BD, Siefen G. Occupational stress among mental health professionals. The relationship between work and recreational pursuits. *Soc Psychiatry. Psychiatr Epidemiol.* 1991; 26:238-244.
- Kumar S, Moro L, Narayan Y. Morbidity among X-ray Technicians. *International Journal of Industrial Ergonomics* 2004, 33(1):29-40.
- Lorusso A, Bruno S, L'Abbate N. Musculoskeletal complaints among Italian X-ray Technologists. *Industrial Health* 2007, 45:705 – 708.
- Murrell K. *Ergonomics: Man in his working environment.* Springer 496p.
- Muscroft J, Hick C. A comparison of psychiatric nurses' and general nurses' reported stress and counseling needs: a case study approach. *Adv Nurs.* 1998; 27:1317-1325.
- O'Keeffe V, Blewett V, Thompson K. Perceptions of Safety information in Nurses understanding of manual handling: Preliminary findings. *Ergonomic Australia Special Edition HFESA 47th Annual Conference*, 1 – 5 (2011).
- Spurgeon A, Harrington JM, Cooper CL. Health and safety problems associated with long working hours: a review of the current position. *Occup Environ Med.* 1997; 54:367-37
- Ugwu AC, Egwu OA, Ochie K, Ewunonu EO, Ovuoba KN, Njoku CO. Incidence of occupational stress among Medical Radiographers: a population based zonal survey. *Nigerian journal of physiological sciences* 2007; 22 (1-2) :123-127.
- Vahdatpour B, Khosravi S, Rahimi A, Sattari S, Mogtadem A, Scole FD, Mashrabi O. Work related musculoskeletal disorders among Radiologists in Isfahan: A cross sectional study. *Res.Journ. of Biol Sci* 2010, 5(10):664 – 669.

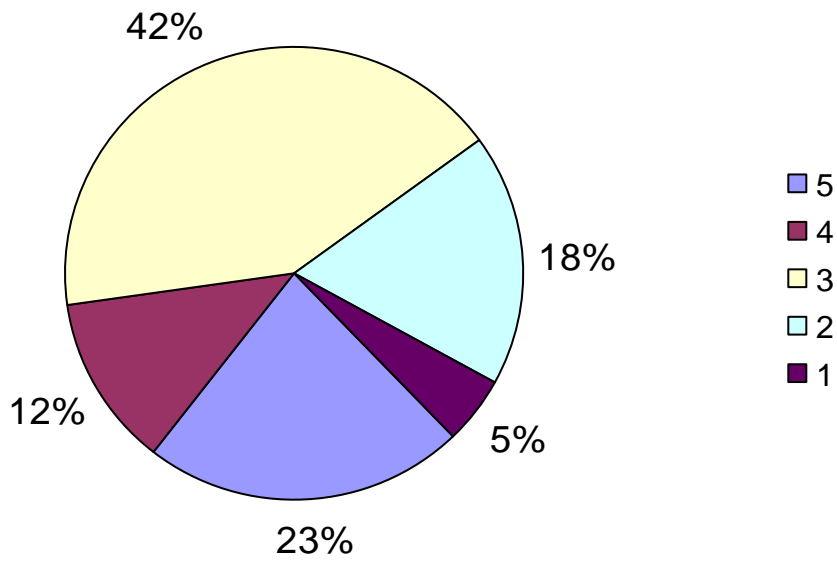


Figure 2: Responses for Job satisfaction among Medical Imaging personnel.

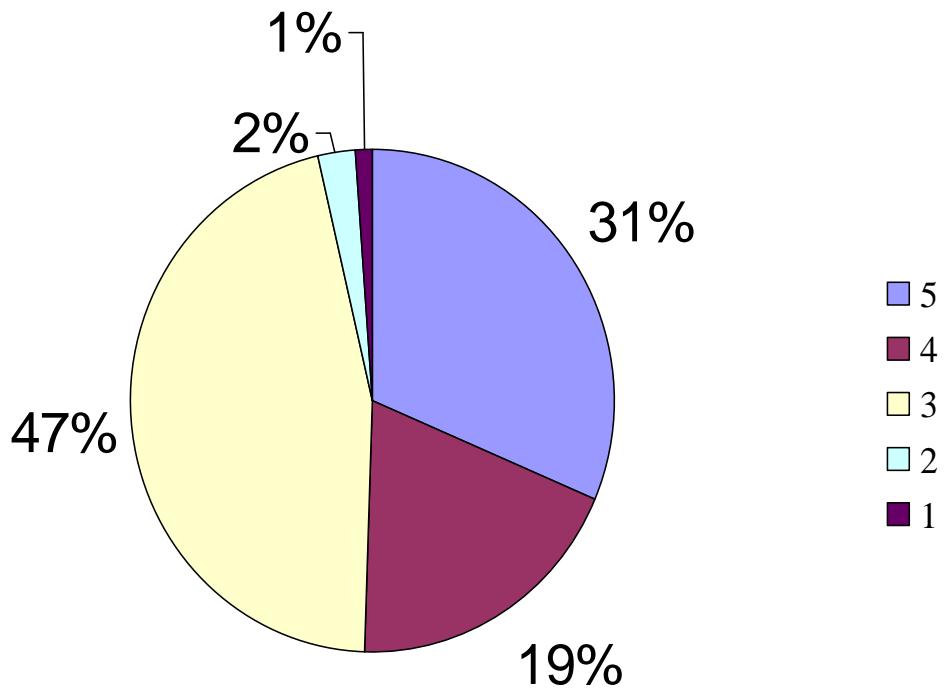


Figure 3: Percentage distribution of responses to Performance issues in the study.

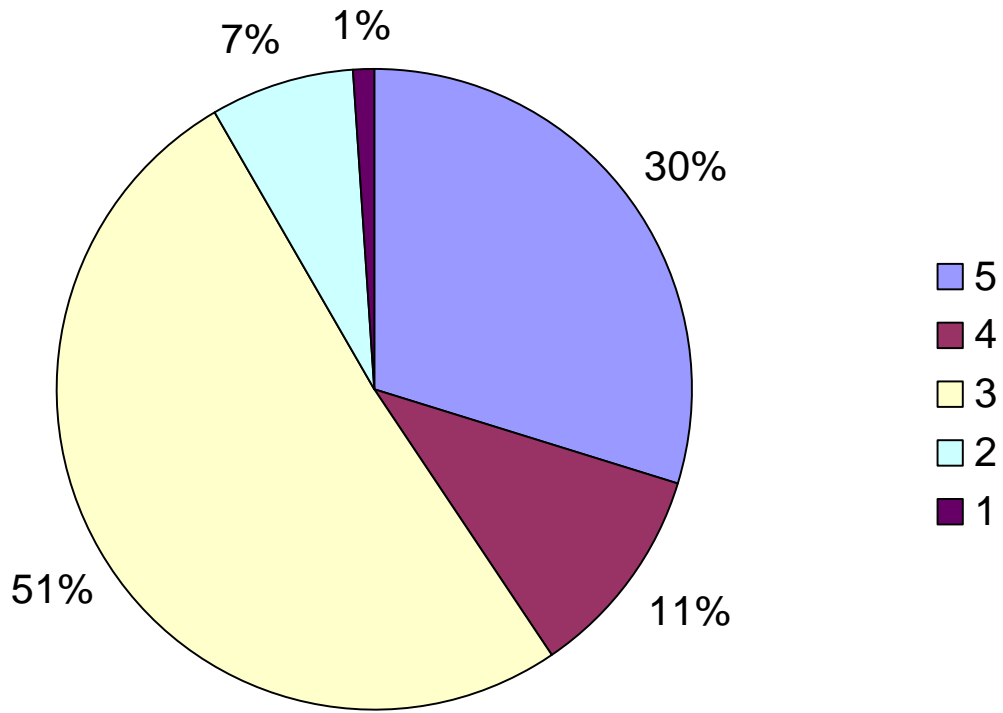


Figure 4: Distribution of respondents for assessment of Health & Safety

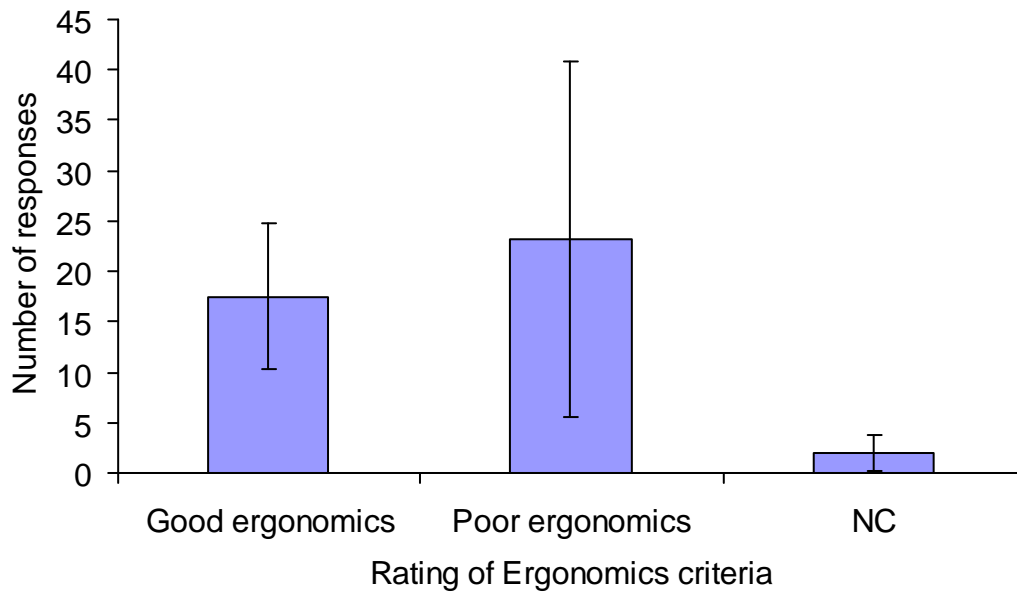


Figure 5: Responses for classification of ergonomics as good or bad. NC implies no comment.

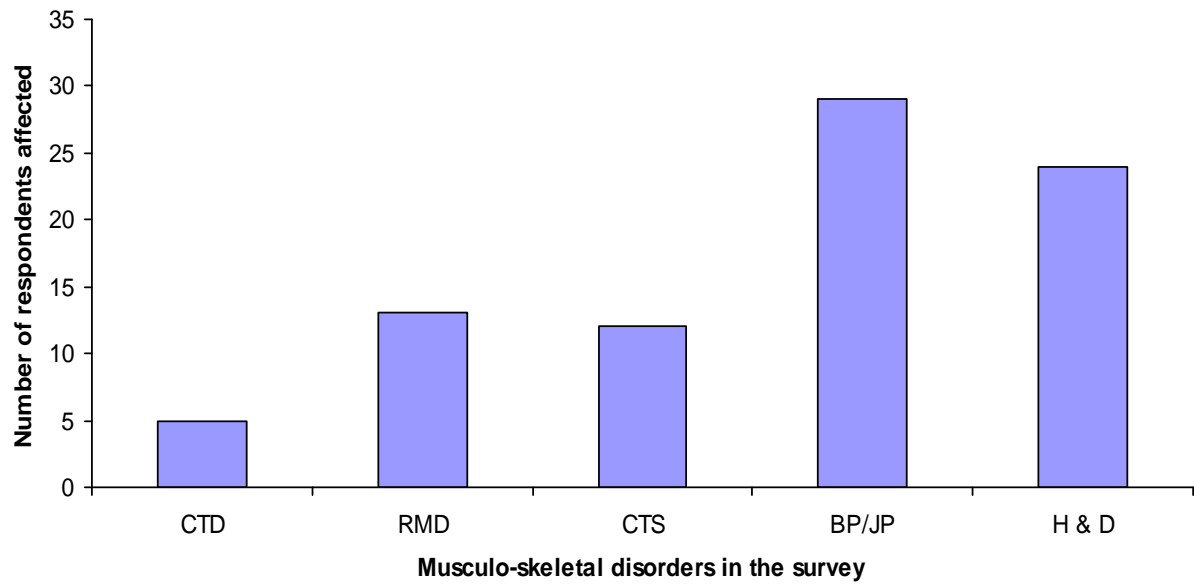


Figure 6: Occurrence of musculoskeletal disorders among the respondents