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A Study To Assess The Effectiveness Of Structured Teaching Programme In Terms Of Knowledge Regarding Prevention Of Work Related Musculoskeletal Disorders Among Computer Employees In A Selected Office Of Delhi With A View To Disseminate An Information Booklet

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Abstract:
Background: *The human musculoskeletal system (also known as the human locomotor system, and previously the activity system) is an organ system that gives humans the ability to move using their muscular and skeletal systems. The musculoskeletal system provides form, support, stability, and movement to the body. It is made up of the bones of the skeleton, muscles, cartilage, tendons, ligaments, joints, and other connective tissue that supports and binds tissues and organs together. The musculoskeletal system's primary functions include supporting the body, allowing motion, and protecting vital organs. The Musculoskeletal disorders adversely affect the function and overall effectiveness of the system. These diseases can be difficult to identify due to the close relation of the musculoskeletal system to other internal systems.*
Materials and Methods: *Pre experimental One group Pre-test Post-test only research design was used to accomplish the objectives in the study. After obtaining the ethical permissions, data collection was done in ACS Global Company, Delhi. A total of 100 Computer Employees were selected for the study using purposive sampling technique. Self-structured knowledge questionnaire was used as the data collection tool and structured teaching programme was conducted after the pre- test. The data analysis was done using descriptive and inferential statistic.*
Results: *The pre test study results showed that 70% Computer Employees had poor knowledge, whereas, 30% had average knowledge while none of the Computer Employees had good knowledge regarding Prevention of Work related Musculoskeletal Disorders. However, after the administration of the structured teaching programme, the post test knowledge scores presented that 78% Computer Employees had good knowledge, 21% had average knowledge and only 1% had poor knowledge regarding Prevention of Work related Musculoskeletal Disorders. Mean pre-test knowledge scores of the sample was lower than the mean post-test knowledge score with a mean difference of 10.95. The calculated 'Z' value of 21.5 was greater at $p < 0.05$.*
Conclusion: *The study results concluded that the structured teaching programme was effective in increasing the knowledge of the Computer Employees regarding Prevention of Work related Musculoskeletal Disorders.*
Keyword: *Computer Employees; Ergonomics; IT professionals; Preventive measures; Repetitive stress injuries; Work- related Musculoskeletal disorders*.

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I. Introduction

Musculoskeletal system gives the body free movement and independent function in the body. Musculoskeletal pain is a known consequence of repetitive strain, overuse and work-related musculoskeletal disorders. The pain can be acute or chronic, focal or diffuse. Musculoskeletal disorders (MSDs) are described as disorders of the muscles, nerves, tendons, ligaments, joints, cartilage, or spinal discs.They are a wide range of inflammatory and degenerative conditions of the locomotors apparatus, including peripheral nerves and supporting blood vessels with consequent pain and discomfort. The term "work-related musculoskeletal disorders" (WMSDs) refers to MSDs that are made worse or long lasting by work conditions. In an age dominated by technology, computers have become a vital tool to keep pace with time and progress. A variety of sectors including banks, government offices, private entities, autonomous institutions etc have computerized their data systems for smooth and faster flow of information. Consequently, the proliferation of computers in

the modern office setting has generated concern related to potential health hazards associated with their use. The prevalence of work-related musculoskeletal disorders (WMSD's) is increasing among computer users throughout the world. Musculoskeletal discomforts such as stiff-ness or pain in the neck, back, shoulder and wrist are common among computer users.

II. Material And Methods

This pre-experimental study was carried out on computer employees employing at ACS Global Company, Delhi. A total of 100 adult subjects (both male and females) of aged between 20years to 40years were for in this study.

Study Design:*Pre experimental One group Pre-test Post-test only research design*

Study Location: ACS Global Company, Delhi.

Sample size: 100 patients.

Subjects & selection method: The study population comprised of computer employees working in selected company. Among this 100 employees specifically working only in IT department were chosen using purposive sampling technique and was conducted between the time period 13/06/2022 to 09/ 07/2022.

Inclusion criteria:
1. Computer employees working in Computer/ IT department.
2. Computer Employees with age group up to 40 years and who are willing to participate.

Exclusion criteria:
1. Computer Employees who are not willing to participate in the study.
2. Computer employees who are unavailable at the time of data collection.

Procedure methodology

After obtaining the ethical clearance from the ethical committee of St. Stephen's Hospital, final study was conducted from 13/06/2022 to 09/07/2022 on 100 computer employees of ACS Global Company, Delhi NCR. The samples were selected using purposive sampling technique. Self-introduction was given and purpose of the study was explained to computer employees. Confidentiality of their response was assured. Formal informed consent was obtained from the sample who met the inclusion criteria. Three shifts of teaching programme were conducted on the same day. On day l, pre-test was conducted using a self structured knowledge questionnaire on Prevention of Work related Musculoskeletal Disorders for which 10-15 minutes time duration was given to the sample to fill the questionnaire. A structured teaching programme on Prevention of Work related Musculoskeletal Disorders was administered to the sample immediately after the pre-test, followed by the post-test on the 8th day using the same structured knowledge questionnaire.

Statistical analysis

The pretest and post test knowledge scores of computer employees regarding Prevention of Work related Musculoskeletal Disorders comparison was done by computing the mean, mean difference, standard deviation and 'Z' value. Also Chi-square test was used to examine the association between the knowledge scores of Computer Employees regarding Prevention of Work related Musculoskeletal Disorders and selected demographic variables.

III. Result

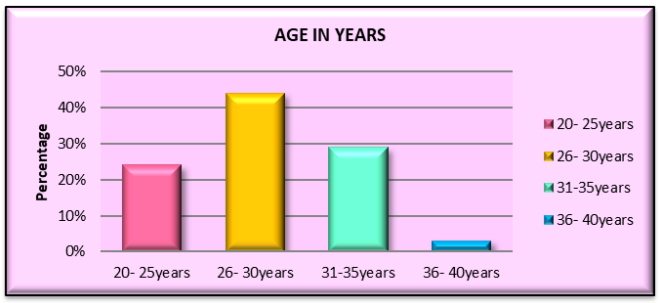
The obtained data and findings will be organized and presented under the following sections;
Section I: Findings related to demographic characteristics of Computer Employees.

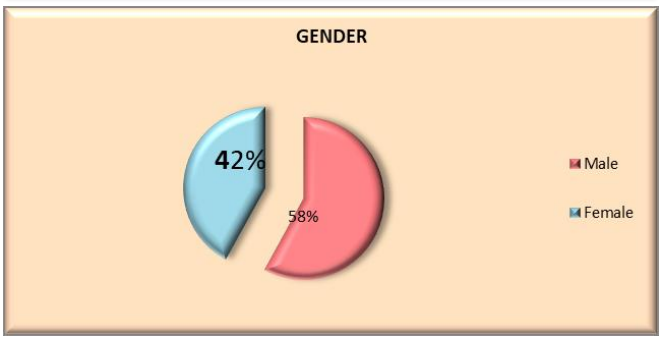
44% of computer employees were in the age group of 26-30 years, 29% were in the age group of 31-35 years, 24% were in the age group of 20- 25 years and remaining 3% were in the age group of 36-40 years. Majority of the computer employees i.e., 58% were Males and remaining 42% were Females. 41% computer employees were having 6- 10 years of experience, 34% of them having 1- 5 years of experience where as only 25% computer employees had more than 10 years of experience. Most of computer employees i.e., 67% were working on computer for > 8 hours per day, 32% were working on computer for 5- 8 hours per day, and 1% was working on computer for less than 4 hours per day. Most of the sample i.e., 39% uses Laptop, 3(30%), 24% uses desktop computers and 37% uses both laptop and desktop computer for work. Most of the sample i.e.; 46% sleeps for 6- 8 hours per day, 43% sleeps for 4- 6 hours per day, 6% sleeps for less than 4 hours per day and 5%

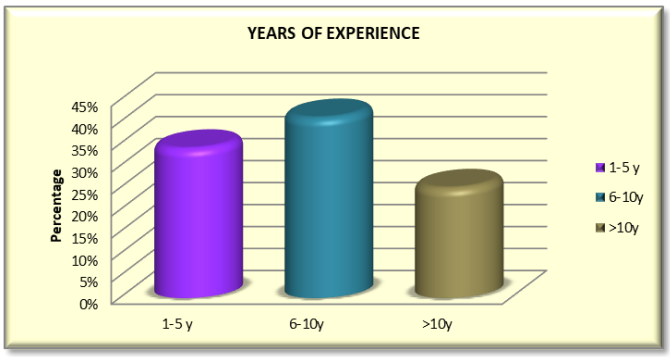
sleeps more than 8 hours per day. 47% of computer employees had self reading as source of information, 30% of them had mass media as source of information whereas 23% had heath personnel as source of information. Most of the computer employees i.e., 67% had no history of any musculoskeletal disorders, 33% have history of musculoskeletal disorders. 75% of the computer employees did not used any preventive measures of WMSDs while 25% had used preventive measures against WMSDs.

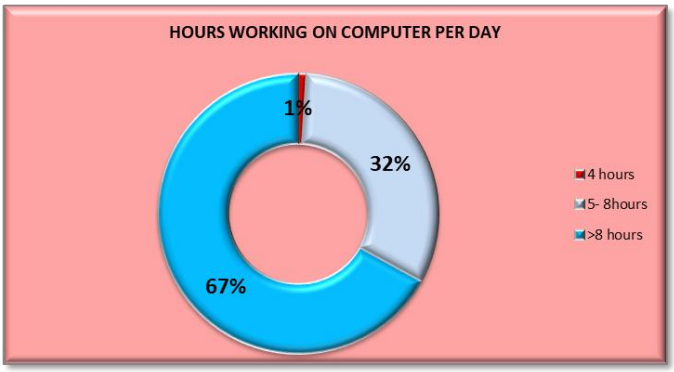
Table no 1: Shows demographic characteristics of Computer Employees.

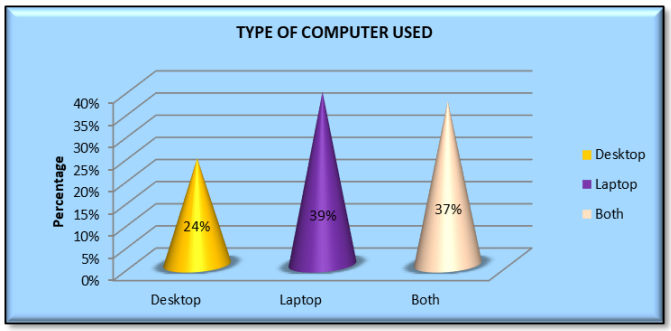
S.No	DEMOGRAPHIC CHARACTERISTICS	Frequency (f)	Percentage (%)
1.	**Age in Years**		
	20years- 25years	24	24%
	26years- 30years	44	44%
	31years- 35years	29	29%
	36years- 40years	3	3%
2.	**Gender**		
	Male	58	58%
	Female	42	42%
3.	**Years of Experience**		
	1years-5years	34	34%
	6years- 10years	41	41%
	>10years	25	25%
4.	**Hours working on a computer per day**		
	4 hours	1	1%
	5- 8hours	32	32%
	> 8hours	67	67%
5.	**Types of computer used**		
	Desktop computer	24	24%
	Laptop computer	39	39%
	Both	37	37%
6.	**Total hours of Sleep in a day**		
	<4 hours	6	6%
	4- 6hours	43	43%
	6- 8hours	46	46%
	>8 hours	5	5%
7.	**Source of Information**		
	Self Reading	47	47%
	Health personnel	23	23%
	Mass media	30	30%
8.	**History of Musculoskeletal disease**		
	Yes	33	33%
	No	67	67%
9.	**Use of preventive measures**		
	Yes	25	25%
	No	75	75%



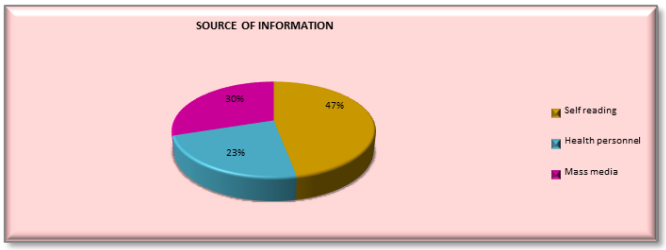


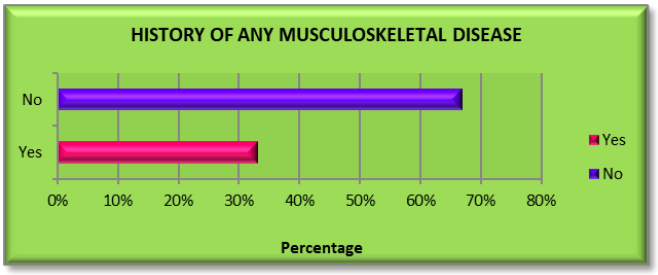

YEARS OF EXPERIENCE
Percentage
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
1-5 y
6-10y
>10y
1-5 y
6-10y
>10y

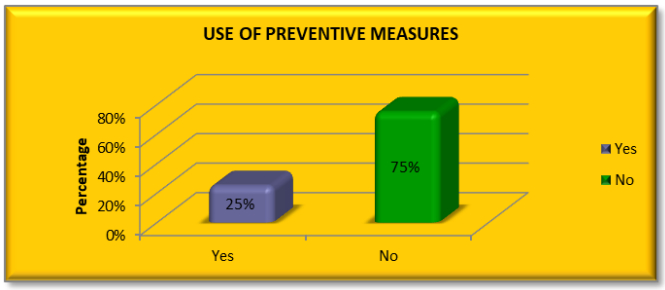

HOURS WORKING ON COMPUTER PER DAY
1%
32%
67%
4 hours
5- 8hours
>8 hours


TYPE OF COMPUTER USED
Percentage
40%
35%
30%
25%
20%
15%
10%
5%
0%
24%
39%
37%
Desktop
Laptop
Both
Desktop
Laptop
Both


TOTAL HOURS OF SLEEP IN A DAY
Percentage
50%
40%
30%
20%
10%
0%
<4 hours
4- 6 hours
6- 8hours
>8 hours
<4 hours
4- 6 hours
6- 8hours
>8 hours


SOURCE OF INFORMATION
30%
47%
23%
Self reading
Health personnel
Mass media





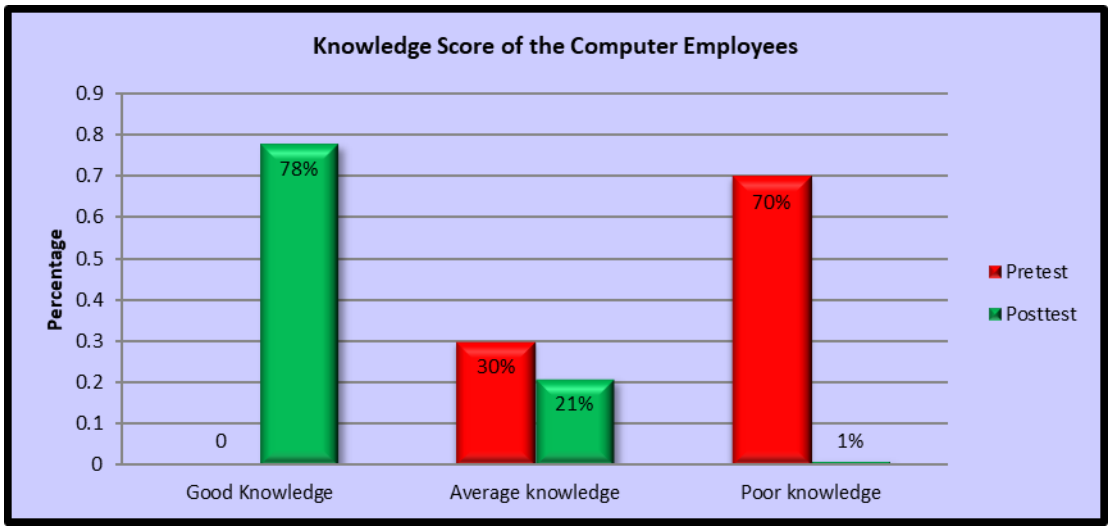
Section II: Findings related to knowledge regarding Prevention of Work related Musculoskeletal Disorders among Computer Employees.

The maximum number of computer employees i.e., 70 (70%) had poor pre- test knowledge, whereas 30(30%) were having average pre- test knowledge while none of the computer employees had good pre- test knowledge regarding Prevention of Work related Musculoskeletal disorders. After the administration of the structured teaching programme, majority of the computer employees i.e.; 78 (78%) had good post- test knowledge, 21(21%) computer employees had average knowledge and only 1% computer employees had poor knowledge regarding Prevention of Work related Musculoskeletal Disorders.

Table no 2: shows knowledge regarding Prevention of Work related Musculoskeletal Disorders among Computer Employees.

Level of Knowledge	Score Range	Pre- Test		Post- test	
		Frequency	Percentage	Frequency	Percentage
Good Knowledge	**21- 30**	-	-	78	78%
Average Knowledge	**11- 20**	30	30%	21	21%
Poor Knowledge	**0- 10**	70	70%	1	1%

Maximum score = 30
Minimum score = 0



Section III: Effectiveness of structured teaching programme on the level of knowledge of Computer Employees on Prevention of Work related Musculoskeletal Disorders.

The mean pre-test knowledge score of the computer employees regarding prevention of work related musculoskeletal disorders was 9.87, median 9 and standard deviation 3.09.The mean post- test knowledge score of the computer employees regarding prevention of work related musculoskeletal disorders was 20.82, median 22 and standard deviation 4.02.Mean pre- test knowledge score of the samples was lower than the mean post-test knowledge score with a mean difference of 10.95.The calculated 'Z' value of 21.5 was greater than the table value of 2.0 at $p<0.05$ level of significance. Hence, the research Hypothesis H1 was accepted and null hypothesis H01 was rejected. The result indicated that the structured teaching programme regarding prevention of Work related Musculoskeletal Disorders was effective in improving knowledge of computer employees.

Table no 3: shows effectiveness of structured teaching programme on the level of knowledge of Computer employees on Prevention of Work related Musculoskeletal Disorders.

Group	Score Range	Mean	Mean Difference	Median	Standard deviation	'Z' value	Critical 'Z' value	'p' value
PRE-TEST	1- 18	9.87	10.95	9	3.09	21.5*	2.0	<0.05*
POST TEST	9- 28	20.82		22	4.02			<0.05*

Maximum score = 30
Minimum score = 0
*** Significant $p<0.05<\alpha= 0.05$**

Section IV: Association between knowledge score of computer employees on Prevention of Work related Musculoskeletal Disorders and selected demographic variables.

There is no association between the level of knowledge of the computer employees regarding prevention of Work related Musculoskeletal Disorders with age as calculated Chi- square value is lower than the table value of 7.82 at degree of freedom 3 at 0.05 level of significance. There is no association between the level of knowledge of the computer employees regarding prevention of Work related Musculoskeletal Disorders with gender as calculated Chi- square value is lower than the table value of 3.84 at degree of freedom 1 at 0.05 level of significance. There is no association between the level of knowledge of the computer employees regarding prevention of Work related Musculoskeletal Disorders with years of experience as calculated Chi-square value is lower than the table value of 5.99 at degree of freedom 2 at 0.05 level of significance. There is no association between the level of knowledge of the computer employees regarding prevention of Work related Musculoskeletal Disorders with total number of hours working on a computer per day as calculated Chi- square value is lower than the table value of 5.99 at degree of freedom 2 at 0.05 level of significance. There is no association between the level of knowledge of the computer employees regarding prevention of Work related Musculoskeletal Disorders with type of computer used as calculated Chi- square value is lower than the table value of 5.99 at degree of freedom 2 at 0.05 level of significance. There is no association between the level of knowledge of the computer employees regarding prevention of Work related Musculoskeletal Disorders with total number of hours of sleep in a day as calculated Chi- square value is lower than the table value of 7.82 at degree of freedom 3 at 0.05 level of significance. There is a significant association between the level of knowledge of the computer employees regarding prevention of Work related Musculoskeletal Disorders with source of information as calculated Chi- square value was higher than the table value of 5.99 at degree of freedom 2 at 0.05 level of significance. . Hence the research hypothesis H2 was partially accepted and the null hypothesis H02 got partially rejected as the results indicated a significant association between level of knowledge of computer employees and the source of information. There is a significant association between the level of knowledge of the computer employees regarding prevention of Work related Musculoskeletal Disorders with history of WMSDs as calculated Chi- square value was higher than the table value of 3.84 at degree of freedom 1 at 0.05 level of significance. . Hence the research hypothesis H2 was partially accepted and the null hypothesis H02 got partially rejected as the results indicated a significant association between level of knowledge of computer employees and the history of WMSDs.There is a significant association between the level of knowledge of the computer employees regarding prevention of Work related Musculoskeletal Disorders with use of preventive measures of WMSDs as calculated Chi- square value was higher than the table value of 3.84 at degree of freedom 1 at 0.05 level of significance. Hence the research hypothesis H2 was partially

accepted and the null hypothesis H02 got partially rejected as the results indicated a significant association between level of knowledge of computer employees and the use of preventive measures of WMSDs.

Table no 4: shows association between knowledge score of computer employees on Prevention of Work related Musculoskeletal Disorders and selected demographic variables. .

S.No	Selected variables	Good Knowledge Frequency (f)	Average Knowledge Frequency (f)	Poor Knowledge Frequency (f)	Chi-Square value	df	Table value
1.	**Age in years**						
	20- 25 years	-	4	20			
	26- 30 years	-	11	33	2.42^{NS*}	3	7.82
	31- 35 years	-	7	22			
	36- 40 years	-	2	1			
2.	**Gender**						
	Male	-	11	47	1.91^{NS*}	1	3.84
	Female	-	13	29			
3.	**Years of experience**						
	1-5 yrs	-	10	24			
	6- 10yrs	-	9	32	0.56^{NS*}	2	5.99
	>10yrs	-	6	19			
4.	**Total number of hours working on a computer per day**						
	4 hours	-	0	1			
	5-8 hours	-	4	28			
	>8 hours	-	20	47	4.41^{NS*}	2	5.99
5.	**Type of computer used**						
	Desktop	-	6	18			
	Laptop	-	12	27	2.22^{NS*}	2	5.99
	Both	-	6	31			
6.	**Total number of hours of sleep in a day**						
	<4 hours	-	2	4			
	4- 6 hours	-	6	37			
	6- 8 hours	-	15	31	5.04^{NS*}	3	7.82
	>8 hours	-	2	3			
7.	**Source of Information**						
	Self reading	-	11	36			
	Health personnel				[		
	Mass media	-	13	10			
		-	6	24	10.10^{S**}	2	5.99
8.	**History of Musculoskeletal disease**						
	Yes	-	18	15	6.50^{S**}	1	3.84
	No	-	19	48			
9	**Use of preventive measures of WMSDs**						
	Yes	-	14	11			
	No	-	20	55	7.18^{S**}	1	3.84

IV. Discussion

The present study aimed to assess the effectiveness of the structured teaching programme on the knowledge of the computer employees regarding prevention of Work- related Musculoskeletal Disorders. The findings of the present study have been discussed in relation to the observation made by other studies which the investigator reviewed. The present study found that sample possesses good knowledge regarding prevention of Work- Musculoskeletal disorders. Out of 100 samples, 78% of the study subjects had good knowledge score, 21% study subjects had adequate knowledge and 1% had poor knowledge in the post- test. Whereas, there was significant association found between the knowledge level and the some selected demographic variables such as source of information, History of WMSDs and preventive measures of WMSDs.

These findings were consistent with study conducted by **Rana Neha (2020),** to assess the effectiveness of self instructional module on computer ergonomics among desktop users working in selected Information Technology Company. 100 desktop users were evaluated in the study. The study showed 74% desktop users were having below average knowledge in pre test and 67% desktop users were having good knowledge in post test, while there was no significant association of pre test level of knowledge regarding computer ergonomics with selected socio demographic variables such as age, gender, professional qualification, marital status, average hours of work per day in front of computer and total experience in job which dealt with computer.

The findings of the present study were similar to the study findings of **Alex Krupa (2019)**, to evaluate the effectiveness of self instructional module on prevention of Musculoskeletal Disorders for computer professionals. 100 computer professionals were evaluated for the study. The result showed that 95% of subjects had adequate level of knowledge and 5%of them had moderately adequate knowledge in the post test. Also it revealed there was no significant association between nature of work, daily exposure and type of computer used.

The findings of the present study were similar to the study findings of **Kumari B (2014),** to assess the effectiveness of Self Instructional Module on Knowledge regarding Preventive Measures of Visual Problems among Software Professionals working in selected software companies. The result revealed that 28 (46.67%) subjects had moderate knowledge and 32 (53.33%) subjects had inadequate knowledge in pretest and 60 (100%) had adequate knowledge in post-test. Also it showed there was no significant association found between other selected variables and pre test level of knowledge.

V. Conclusion

The main objective of the study was to assess the effectiveness of structured teaching programme in terms of knowledge of computer employees regarding Prevention of Work related Musculoskeletal Disorders. Majority of computer employees had poor knowledge score and average knowledge score before the administration of structured teaching programme. After the administration of structured teaching programme there was a significant increase in the knowledge of computer employees regarding Prevention of Work related Musculoskeletal Disorders. Mean pre-test knowledge score of the samples was lower than the mean post-test knowledge score with a mean difference of 10.95. The calculated 'Z' value of 21.5 was greater than the table value of 2.0 at $p < 0.05$ level of significance. No significant association between the level of knowledge of the computer employees regarding Prevention of Work related Musculoskeletal Disorders and the selected demographic variables such as Age, Sex, Years of experience, Hours working in computer per day, Type of computer used, Hours of sleep per day as calculated Chi-square test value was found non-significant at $p<0.05$. Significant association between the level of knowledge of the computer employees regarding Prevention of Work related Musculoskeletal Disorders and the selected demographic variables such as Source of Information, History of WMSDs and Use of preventive measures of WMSDS as calculated Chi-square test value was found significant at $p<0.05$.

VI. Implications

The findings of the present study to assess the Effectiveness of Structured Teaching Programme in terms of Knowledge regarding Prevention of Work related Musculoskeletal Disorders among Computer Employees can have several implications to Nursing Education, Nursing Practice, Nursing Research and Nursing Administration.

Nursing practice

- The study findings will help the occupational health nurse to create awareness among the employees towards the work associated musculoskeletal disorders.
- Nurses have great responsibilities to improve Knowledge and attitude towards the work related musculoskeletal disorders among health personnels.
- The occupational health nurses can plan, implement and evaluate various teaching programmes regarding work related musculoskeletal disorders.

Nursing Education

- The student nurse may be educated to teach the community with the different aspects of knowledge regarding work related musculoskeletal disorders.
- There must be adequate lectures and hands- on practice sessions on WMSDs prevention and management to ensure adequate knowledge and practice skills among the IT students.
- Demonstration of the ergonomic exercise can be taken in class for IT students to update their knowledge regarding WMSDs.

Nursing Administration

- Nursing leaders must utilize available resources which are technologically sound in teaching through the mass health education programme.
- Professional interaction between the nurses and the public will help to improve professional standards and creates better image in the community.

Nursing Research

- Nursing research can help gather information about the knowledge level of the computer employees regarding WMSDs.
- Nursing research can be useful for evaluating different strategies for enhancing the knowledge level.
- Promote more research in innovative areas such as Computer Health Problem.
- This study will serve as a valuable reference material for future investigators.

VII. Limitations

The present study was conducted on a limited number of subjects in one setting. Therefore, broad generalization cannot be made.

VIII. Recommendations

- This study can be conducted on a larger sample size in different hospital settings.
- A quasi-experimental study can be conducted to assess the effectiveness of other teaching modalities on the knowledge of computer employees, software engineers and IT students.
- A similar study can be done to evaluate effectiveness of various other teaching modalities on the knowledge of the computer employees regarding prevention of WMSDs.
- Similar study would be replicated to assess the difference in knowledge scores of computer employees who have attended ergonomic training programme and those who did not attend any ergonomic training programme.
- A similar study can be conducted to assess the knowledge, skill and practice of the computer employees regarding WMSDs prevention and Ergonomic Practice.
- A follow up study can be conducted to evaluate the effectiveness of structured teaching programme on computer employees regarding WMSDs.

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