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# EFFECTIVENESS OF AN AWARENESS PROGRAMME ON KNOWLEDGE REGARDING PREVENTION OF CARPAL TUNNEL SYNDROME AMONG IT WORKERS OF SELECTED URBAN AREAS.

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**ABSTRACT:**

**Background:** Carpal tunnel syndrome (CTS) is the neurological disease that occurs when the median nerve, which runs from your forearm into the palm of the hand, becomes pressed or squeezed at the wrist. Carpal Tunnel Syndrome affects 1–5% of the general population, with a higher prevalence in females (3:1 ratio). Overall prevalence is reported as 2.7–5.8%, and the risk is doubled in obese individuals. Among computer workers, prevalence is 13.1% (95% CI 10.5–15.7%), with greater risk seen in those with over 8 years of computer use, more than 12 working hours/day, system administrators, and those maintaining flexed or extended wrist positions. **Objectives:** To evaluate the effectiveness of an awareness programme on knowledge regarding prevention of carpal tunnel syndrome among IT workers of selected urban areas. **Methodology:** A pre-experimental one-group pre-test post-test design was adopted. 60 IT workers were selected through non-probability convenience sampling from selected urban areas. Data were collected using a self-structured knowledge questionnaire on prevention of Carpal Tunnel Syndrome. Following the pre-test, an awareness programme was conducted, and the post-test was administered on the 7th day. The tool's validity and reliability were established, and data were analyzed using descriptive and inferential statistics. **Results: -** The pre-test mean knowledge score was 8.61 (SD = 5.47), which increased to 19.68 (SD = 2.88) in the post-test. The paired t-test indicated a significant improvement, showing that an awareness programme effectively enhanced IT workers knowledge regarding the prevention of carpal tunnel syndrome. **Limitation:** The study was limited to IT workers of selected urban areas. **Conclusion:** Efforts are made to increase knowledge regarding Prevention of Carpal tunnel syndrome through an awareness programme. Hence, an awareness programme was effective in enhancing knowledge regarding prevention of carpal tunnel syndrome among the IT workers.

**KEYWORDS:** An awareness programme, Carpal tunnel syndrome, Knowledge, IT workers.

## I. INTRODUCTION

Carpal tunnel syndrome (CTS) is the neurological disease that occurs when the median nerve, which runs from your forearm into the palm of the hand, becomes pressed or squeezed at the wrist. You may feel numbness, weakness, pain in your hand and wrist, fingers may become swollen and useless.[1] In IT workers Carpal tunnel syndrome more common because repetitive motions using a computer mouse and mouse and typing on a keyboard can cause this syndrome. The way an individual places their hands on a keyboard or computer mouse, positioning the wrists and fingers in one way for long periods of time, can lead to compression on the median nerve.[2]Carpal tunnel syndrome is the relatively common in office workers or ladies are at the greater risk.[3] CTS is the most common disorder. The estimated prevailing of CTS in the general population is between 1 to 5 %. CTS is more frequent in

ladies with a female-to-male ratio of approximately 3 to 1. Carpal tunnel syndrome (CTS) is a common neurological disorder with the prevalence of 2.7%–5.8% in general population. The risk of growing CTS is doubled in individuals who are fat. In computer workers, the prevalence of CTS was found to be 13.1% (95% CI 10.5-15.7%). Subjects with over eight years of computer work, over 12 hours of work / day and system administrators were at a higher risk for CTS (OR 3.3, 4.9 and 2.5 accordingly). Flexed or extended hand position had higher risk for Carpal Tunnel Syndrome.[4]

## II. STATEMENT OF THE PROBLEM:

To Evaluate the Effectiveness of an Awareness Programme on Knowledge Regarding Prevention of Carpal Tunnel Syndrome Among IT Workers of Selected Urban Areas.

## III. OBJECTIVE

1. To assess pretest knowledge score regarding prevention of carpal tunnel syndrome among IT workers of selected urban areas.
2. To evaluate the effectiveness of an awareness programme on knowledge regarding prevention of carpal tunnel syndrome among IT workers of selected urban areas.
3. To find out association of the study findings with selected demographic variables.

## IV. HYPOTHESIS:

**$H_0$** - There is no significant difference between the pre-test and post-test knowledge scores regarding prevention of carpal tunnel syndrome among IT workers.

**$H_1$** - There is significant difference between the pre-test and post-test knowledge scores regarding prevention of carpal tunnel syndrome among IT workers.

## V. MATERIAL & METHODOLOGY

**5.1. Research Design:** A pre-experimental one group pre-test post-test design.

**5.2. Study setting:** The study was conducted in Selected urban areas of Nagpur district, Maharashtra, India.

**5.3. Population & Sample:** IT workers of selected urban areas in Nagpur.

**5.4. Sample Size estimation:** The sample size was determined using a sample size formula based on population proportion, considering both inclusion and exclusion criteria for participant selection.

Formula Used: (Comparing two proportion Paired- before after)

$$\phi = \frac{\pi_A(1-\pi_B)}{\pi_B(1-\pi_A)}$$

$$\pi_{Discordant} = \pi_A(1-\pi_B) + \pi_B(1-\pi_A)$$

$$N_{pair} \geq \frac{(Z_{1-\alpha/2}(1-\phi) + Z_{1-\beta}\sqrt{(\phi+1)^2 + (\phi-1)^2\pi_{Discordant}})^2}{(\phi-1)^2\pi_{Discordant}}$$

$\pi_A$ = Expected proportion of outcome before the study = 0.10% (Assumed). (Before)

$\pi_B$ = Expected proportion of outcome after the study = 0.35%After)

Z (table value at α =0.05) = 0.05(one tail)
Z (table value at 1- β =0.80) = 0.2
Total sample size= 50
Putting these values in formula, the required sample size = 50
10% Drop out sample size:
= 50*10/100=5
50+5=55. Rounded up to: 60.
The number of samples selected in the study is 60.
Study Reference: Tawakul A et al[5]
Statistical Methods: t test, Chi-square test
Software Used: SPSS 27.0 version
A total of 60 participants were selected using McNemar test formula.

**5.5. Sampling Technique:** Non-probability convenience sampling technique.

**5.6. Sampling Criteria**

**Inclusion Criteria**

1.IT workers who were willing to participate in the study.
2.IT workers who were given informed written consent to participate in the study.
3.Those who were able to speak English.

**Exclusion Criteria:** IT workers who had completed training on prevention of carpal tunnel syndrome.

**5.7. Variables**

- Independent Variable: An awareness programme on prevention of carpal tunnel syndrome.
- Dependent Variable: Knowledge.
- Demographic Variables: Age, gender, educational qualification, years of experience in IT sectors, family type, income per month of family, and working hours in office.

**5.8. Tool:** Tool is a research instrument is a device used to measure the concept of interest in a research project that a investigator uses to collect data.

**Section-A: Demographic variables**. Data was collected using a structured questionnaire developed by the investigator after an extensive review of literature and guidance from subject experts.

**Section-B: Self-structured questionnaires on knowledge:** This section comprised multiple-choice questions and structured items designed to assess participants' knowledge regarding prevention of carpal tunnel syndrome. The items covered domains such as definition, causes, signs and symptoms, diagnosis, preventive measures, surgery and treatment modalities, carpal tunnel exercises. Each correct response was awarded one mark, while incorrect or "don't know" responses received zero. Higher scores indicated better knowledge levels.

## VI. VALIDITY & RELIABILITY:

**6.1. Content Validity:** Content validity was established by a panel of experts in community health nursing & medical surgical nursing, and the Scale Content Validity Index (S-CVI) confirmed that the items were relevant and representative. Reliability testing was conducted on 10 samples; Cronbach's alpha was 0.8345 for the knowledge questionnaire indicating high reliability.

**6.2. Construct Validity:** Construct validity was assessed through Exploratory Factor Analysis (EFA) using Principal Component Analysis (PCA). Sampling adequacy was confirmed by a Kaiser–Meyer–Olkin (KMO) value of 0.82, and Bartlett's test of sphericity was significant, confirming the suitability of the data for factor analysis. Components with eigenvalues greater than 1 were extracted, and items demonstrated factor loadings above 0.40. These results established that the instrument effectively measured the intended constructs of knowledge regarding prevention of carpal tunnel syndrome.

**6.3. Reliability:** In this study reliability was tested on 10 samples by Cronbach's alpha method for knowledge.: 0.8345

## VII. DATA COLLECTION PROCESS:

The study was conducted after IEC approval (GMC/IEC/2023-24/2090 dated 23.02.24) and permissions from the concerned authorities to conduct the study. A pilot study was conducted to check the feasibility and reliability of the tool and procedure. Following necessary refinements, the main study was initiated after a gap of seven days. A total of 60 IT workers were selected using a non-probability convenience sampling technique. After selection, the investigator introduced herself to the participants, explained the purpose and steps of the research study, and obtained written informed consent from all participants. Demographic data were collected using a structured questionnaire, followed by the administration of a pre-test to assess baseline knowledge regarding prevention of carpal tunnel syndrome. The intervention phase consisted of administering an awareness programme on knowledge regarding prevention of carpal tunnel syndrome. A post-test was conducted on the 7th day after completion of the intervention to measure changes in knowledge. The planned sample size of 60 IT workers was successfully achieved as per the inclusion criteria**.**

## VIII. DESCRIPTION OF INTERVENTION:

The intervention in this study was the administration of an awareness programme on knowledge regarding prevention of carpal tunnel syndrome. An awareness programme was a strategic initiative or campaign designed to inform and educate a specific audience or the public developed by the investigator to provide comprehensive information about prevention of carpal tunnel syndrome including its definition, causes, signs and symptoms, diagnosis, preventive measures, surgery and treatment modalities, carpal tunnel exercises. An awareness programme was designed in simple, understandable language and supplemented with illustrations to enhance clarity and retention. After the pre-test was conducted, the intervention was an awareness programme designed to enhance knowledge of IT workers regarding prevention of Carpal Tunnel Syndrome. The programme aimed equip IT workers with the necessary knowledge to early identify sign and symptoms of Carpal Tunnel Syndrome and provide appropriate intervention. An awareness programme conducted for 45 minutes and make used of realistic scenarios, power point presentation and banner. An awareness programme involved interactive lectures, discussion and demonstration method. One week after the administration of an awareness programme, a post-test was conducted using the same structured knowledge questionnaire to evaluate the effectiveness of the intervention.

## IX. DATA ANALYSIS:

Descriptive statistics (frequency, percentage, mean, SD) and inferential statistics (paired t-test, chi-square) were used. A quantitative research approach with a pre-experimental, one-group pre-test post-test design was utilized for this study. The study was conducted in selected urban areas of Nagpur city. The study involved 60 participants selected using a non-randomized control method to minimize bias. Data were analyzed across two timelines: pre-test (Day 1) and post-test (Day 7). The results are organized into descriptive and analytical summaries as per the study objectives. Reliability testing was conducted using Cronbach's alpha to assess the consistency of the tools used. The pilot study results showed a reliability score of r' = 0.8345 for the knowledge questionnaire indicating high reliability. The overall Cronbach's alpha value of 0.885 confirms that the tools used in the study demonstrated acceptable reliability. Data analysis was performed using descriptive and inferential statistics, including the paired 't' test and Chi-square test, with a significance level set at $p<0.05$.

## X. RESULT:

The data analysis was organized into four sections.
**Section 1:** Distribution of IT workers with regards to demographic variables.
**Section 2:** Assessment of level of pretest and post-test knowledge score regarding Prevention of Carpal Tunnel Syndrome among IT workers of selected urban areas.

**Section 3:** Evaluation of effectiveness of an Awareness Programme on knowledge regarding Prevention of Carpal Tunnel Syndrome among IT workers of selected urban areas.

**Section 4:** Association of level of pretest knowledge score regarding Prevention of Carpal Tunnel Syndrome among IT workers of selected urban areas with their selected demographic variables.

Together, these sections provided a comprehensive analysis of the data, measuring both the effectiveness of the intervention and the influence of demographic factors.

**Table 1: Percentage wise distribution of IT workers according to their demographic variables.**
**n=60**

| Demographic Variables | No. of IT workers | Percentage (%) |
|---|---|---|
| **Age(yrs)** | | |
| 25-34 yrs | 40 | 66.7 |
| 35-44 yrs | 16 | 26.7 |
| 45-54 yrs | 4 | 6.7 |
| ≥55 yrs | 0 | 0 |
| **Gender** | | |
| Male | 30 | 50 |
| Female | 30 | 50 |
| Transgender | 0 | 0 |
| **Educational qualification** | | |
| BE | 18 | 30 |
| ME | 2 | 3.3 |
| BCA | 18 | 30 |
| MCA | 6 | 10 |
| B. Tech | 3 | 5 |
| MBA | 13 | 21.7 |
| **Years of experience** | | |
| 1-5 yrs | 36 | 60 |
| 6-10 yrs | 18 | 30 |
| 11-15 yrs | 5 | 8.3 |

| | | |
|---|---|---|
| 16-20 yrs | 1 | 1.7 |
| >20 yrs | 0 | 0 |
| **Family type** | | |
| Nuclear | 24 | 40 |
| Joint | 25 | 41.7 |
| Single Parent | 5 | 8.3 |
| Extended | 6 | 10 |
| **Monthly family income (Rs)** | | |
| 20000-30000 Rs | 5 | 8.3 |
| 30001-40000 Rs | 17 | 28.3 |
| 40001-50000 Rs | 19 | 31.7 |
| >50000 Rs | 19 | 31.7 |
| **Working Hours** | | |
| 6 hrs | 1 | 1.7 |
| 8 hrs | 54 | 90 |
| 10 hrs | 5 | 8.3 |
| 12 hrs | 0 | 0 |

This table 1 illustrated that most IT workers were aged 25-34 years (66.70%), Each 50% of IT workers were male and female. Each 30% of IT workers educated upto BE and BCA, 10% upto MCA, 5% upto MCA and 21.70% of them were educated upto MBA. 60% of IT workers had years of experience of 1-5 years, 41.70% were from joint families, and each 31.70% of them had monthly family income of 40001-50000 Rs and more than 50000 Rs.
90% of IT workers had working hours of 8 hours.

**Table 2: Assessment with level of pre-test knowledge score**

**n=60**

| Level of knowledge | Score Range | Level of Pre-test Knowledge Score | |
|---|---|---|---|
| | | **No of IT workers** | **Percentage** |
| **Inadequate Knowledge** | 0-50% | 44 | **73.3** |
| **Moderate Knowledge** | 51-75% | 16 | **26.7** |
| **Adequate Knowledge** | 76-100% | 0 | **0** |
| **Minimum score** | | **8** | |
| **Maximum score** | | **19** | |
| **Mean knowledge score** | | **8.61±5.47** | |
| **Mean % Knowledge Score** | | **28.72±18.24** | |

This table 2 illustrated that 73.3% of IT workers in pretest had inadequate knowledge score and 26.7% had moderate knowledge score. Minimum knowledge score in pretest was 8 and maximum knowledge score in pre-test was 19. Mean knowledge score in pretest was 8.61±5.47 and mean percentage of knowledge score in pre-test was 28.72±18.24.

**Table 3: Assessment with level of post-test knowledge score**

**n=60**

| Level of knowledge | Score Range | Level of Post test Knowledge Score | |
|---|---|---|---|
| | | No of IT workers | Percentage |
| **Inadequate Knowledge** | 0-50% | 4 | **6.67** |
| **Moderate Knowledge** | 51-75% | 44 | **73.33** |
| **Adequate Knowledge** | 76-100% | 12 | **20** |
| **Minimum score** | | **12** | |
| **Maximum score** | | **25** | |
| **Mean knowledge score** | | **19.68±2.88** | |
| **Mean % Knowledge Score** | | **65.61±9.61** | |

This table 3 illustrated that 6.67% of IT workers in post-test had inadequate knowledge score, 73.33% had moderate level of knowledge score and 20% of IT workers had adequate level of knowledge score. Minimum knowledge score in post-test was 12 and maximum knowledge score in post-test was 25. Mean knowledge score in post-test was 19.68±2.88 and mean percentage of knowledge score in post-test was 65.61±9.61.

**Table 4: Significance of difference between knowledge score in pretest and post-test of IT workers**

**n=60**

| Overall | Mean | SD | Mean Difference | t-value | p-value |
|---|---|---|---|---|---|
| **Pre-Test** | 8.61 | 5.47 | 11.6±6.28 | 13.64 | **0.0001 S,p<0.05** |
| **Post Test** | **19.68** | **2.88** | | | |

This table 4 illustrated that the paired 't' test showed a calculated value of 13.64, which was much higher than the tabulated value of 2.00 at 5% significance level (df = 59). This indicates a statistically significant improvement in knowledge after an awareness programme, hence $H_1$ was accepted.

**Table 5: Association of Pretest Knowledge Score with Selected Demographic Variables of IT workers**

**n = 60**

| Demographic Variable | $\chi^2$ value | p-value | Association |
|---|---|---|---|
| **Age in years** | 25.67 | 0.0001 | **Significant** (p<0.05) |
| **Gender** | 0.00 | 1.00 | Not significant |
| **Educational Qualification** | 25.18 | 0.0001 | **Significant** (p<0.05) |
| **Years of experience** | 1.02 | 0.79 | Not significant |
| **Type of family** | 0.52 | 0.91 | Not significant |
| **Monthly family income (Rs.)** | 1.51 | 0.68 | Not significant |
| **Working hours** | 3.39 | 0.18 | Not significant |

This table 5 illustrated that pretest knowledge scores of IT workers were significantly associated with age ($\chi^2$=25.67, p=0.0001), and educational qualification ($\chi^2$=25.18, p=0.0001). Other variables, such as gender, years of experience, type of family, monthly family income (rs.) and working hours were not significant. This indicated that knowledge of prevention of carpal tunnel syndrome was influenced mainly by age and educational qualification.

## XI. DISCUSSION

The present study aimed to evaluate the effectiveness of an awareness programme on knowledge regarding prevention of carpal tunnel syndrome among IT workers of selected urban areas Findings demonstrated a significant rise in knowledge scores post-intervention, confirming that an awareness programme was a valuable educational strategy.

The present study findings are supported by A**b**dullah Tawakul et al. (2023) in Saudi Arabia, where 1,400 individuals from the western region completed an online survey. Among them, 57.1% were female and 88.7% Saudi. While over half of the participants showed good awareness of CTS causes (52.5%) and features (54.4%), awareness of treatment (56%), effects (51.9%), and prevention (52.8%) was poor. The study concluded that overall awareness of CTS was insufficient, recommending awareness camps and suggesting a link between CTS and chronic diseases.[6] Similarly, the present study findings were supported by Moaath A. Alamir, Rakan K. Alfouzan et al. (2023) studied the middle-aged population in Riyadh and found major knowledge gaps: 66.3% uncertain about diagnosis, 55.4% with low knowledge of symptoms, and 54.7% with low awareness of risk factors. The study highlighted the underreporting of CTS and emphasized the need for targeted educational programs to bridge knowledge gaps and promote informed health decisions.[7] The findings of the study indicated that the knowledge regarding the prevention of Carpal Tunnel Syndrome among IT workers of selected urban areas was found to be inadequate. The study found that in the pretest knowledge score had a mean of 8.61±5.47, which experienced a substantial improvement in the post-test with a mean of 19.68± 2.88, reflecting a significant increase of 11.07 in knowledge score. The p value 0.0001 which was less than 0.05 level of significance. Thus, Null hypothesis ($H_0$) was rejected and alternate hypothesis ($H_1$) was accepted. The result also indicated that, there was a positive correlation with Knowledge but there was significant statistical association with Knowledge and some demographic variables.

## XII. CONCLUSION:

After a detailed analysis, this study leads to the following conclusion an awareness programme regarding prevention of carpal tunnel syndrome were found to be effective in improving the knowledge of IT workers. IT workers had a significant gain in knowledge regarding prevention of carpal tunnel syndrome. Hence, based on the above findings, it was concluded undoubtedly that the written prepared material by the investigator and training in the form of an awareness programme helped the IT workers to improve their knowledge regarding prevention of Carpal Tunnel Syndrome.

## XIII. ETHICAL CONSIDERATION:

The study conducted approval was obtained from the Institutional Ethics Committee, Government Medical College, Nagpur (GMC/IEC/2023-24/2090 dated 23.02.24) Written informed consent was taken from each participant for participation in study.

## XIV. LIMITATION:

Small sample size (60 IT workers) limits generalizability. The study was limited to the IT workers of selected urban areas.

## XV. RECOMMENDATION

Based on the study's findings, the following recommendations were proposed:

A similar study can be conducted on large scale. A descriptive study can be carried out to assess the level of knowledge regarding prevention of carpal tunnel syndrome among industrial workers. A similar study can be replicated by using other sampling technique.

A similar study can be conducted in other settings also.

## XVI. CONFLICT OF INTEREST

The authors declare no conflict of interest.

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