Prevalence of Hand Dysfunction among Computer Professionals Using Jebsen Taylor Hand Function Test in Puducherry Region

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Abstract: *Background: Hand dysfunction is an motor impairment often associated with the computer professionals due to the regular usage of computer for an long hour in front of the computer desk. The Jebsen Taylor Hand Function Test (JTHFT) was used in this study, to evaluate the hand dysfunction. Hence, this study aims to rule out the prevalence of hand dysfunction using JTHFT and to investigate the effect of age & gender differences, on hand functioning in computer professionals. Method: In this study, prevalence design, random sampling was used. Sixty individuals were taken and equally categorized into two age groups: 20-29 & 30 39. The JTHFT subtests were introduced to all participants, which included the writing, card turning, picking up small common objects, simulated feeding, stacking checkers, picking up large light objects, picking up large heavy object. Speed on each subtest was calculated in seconds, and the total score was computed. Result: After statistically analyzing (chi-square test and SPSS version 20) the data collected it was found that there is a prevalent of hand dysfunction among the computer professionals in Puducherry region. Conclusion: This study concluded that the prevalence of hand dysfunction among the computer professionals in the region of Puducherry, India, were found to be changed according to the two age group from 20-29 (28.02 %), 30-39 (32.01 %) among this sixty individuals. Moreover, there is no significant results were found in association with the gender.*

Keywords: Computer professionals, Hand dysfunction, Jebsen Taylor Hand Function Test

1. Introduction

The hand dysfunction is defines as the motor impairment[1] and it was found that work-related activities that involve abnormal repetitive movement or sustained static posture of the upper extremity, head and neck that are maintained for extended period of time can affect the nerves and other soft tissue stretches in the upper quadrant resulting in this. Thus the main purpose of this study is to find out the hand dysfunction among computer users[2].

Now a days, the computers have become a vital tool to keep pace with time and progress[3] and the prevalence of risk factor affecting the motor performance, symptomatic neck and shoulder musculoskeletal disorder among the computer users are on the rise[4]. Due to the regular usage of computer for an long hours will develop these type of disorder and likewise they also having the chance of getting hand dysfunction associated with these conditions due to the same posture while doing working in front of the computer desk[2].

The Hand represents an excellent model in complex motor control that contribute to 90% of upper limb function, this complex structure is used to both to grasp objects of all shapes and sizes through the coupled action. The evaluation of hand function is a crucial element that depends on anatomical integrity, muscle strength, sensation and integrity, these abilities can be influenced by the age, gender, handeness[5].Meanwhile in computer users also, there will be an presence of hand dysfunction may occur in relation with age groups due to the long period of working hours while doing Working[2, 14, 15]

This condition was appear to be a fairly common condition and is usually identified among parkinson's disease, hand conditions, computer professionals diabetes[1, 6, 7] etc., There are many studies were done in Australia, china, Asia and Egyptian region[8, 9, 10, 5] and in India also. According to the researches, it was founded that the hand related dysfunction

was about 42.6%, in another study it was stated that according to the age group the that from 21 to 30 yrs (68.9%) and about 76.5% in 40-55 yrs of age, in Right handed (42.8%) and left handed (34.0%) both right and left hand it will be 33.2%[7, 2].

A number of tools have been developed which focus on identifying the presence of hand dysfunction among various individuals and even in computer users also. There was many test is there like 9-hole peg test, purdue pegboard test. But the Jebsen Taylor Hand Function Test (JTHFT) was chosen, as it provides measurement of standardized tasks relative to norms and the result from numerous studied showed that JTHFT is a valid assessment tool for the measurement of various patient populations (stroke, spinal cord injury, hand and wrist fractures)[9] and have been now used in computer professionals.So our ultimate aim of this study is to evaluate the hand dysfunction among computer individual that whether it is present or not?

The Jebsen Taylor Function Test, is a valid standardized test of hand function The test-retest and internal consistency of the total score on the dominant and nondominant hands were ICC 0.74 (95% Cl 0.01, 0.83) and ICC 0.72 (95% Cl 0.59, 0.82) respectively [13].Results from many studies shows that the JTHFT is a valid assessment tool for the measurement of hand dysfunction among a variety of population. It evaluates common aspects of hand function commonly used in ADL, Moreover it can be used in many local settings and can be administered in a short time by using readily available material. It consists of 7 subtests like writing, card turning, lifting small common objects, simulated feeding, lifting large light and heavy objects, each subtest to is timed and can be compared with the established norms[5]. The JTHFT yields standard scores, separately male and female are combined, age equivalency[15, 16, 13] scores was also available.

Considering the importance of timely evaluation of hand dysfunction will help to prevent the further complication

among computer professionals. The purpose of this study is to identify the prevalence of hand dysfunction among the computer professionals in Puducherry region. The aim of the study is to rule out the prevalence of hand dysfunction among computer professionals using JTHFT in puducherry region.

2. Method

A total of 60 (male and female) subjects were participated in this study and categorized according to the age group that from 20-29 years (male -18, female-12) and 30-39 years (male-13, female-17) to predict the hand dysfunction. Both the age group computer professional were selected by with random sampling and were recruited from the software company's in and around Puducherry region. This study design was a type of prevalence study.

The included subjects were computer professionals age group from 20 to 40 years, more than 8 hrs and 5 years of working (male and female), individual who is willing to participate. Individuals were excluded if they had a visual problems, neurological disorder, any recent fracture, previous history of hand related conditions.

3. Procedure

The subjects who fulfill the inclusion criteria were included in this study. Such eligible subjects were selected after obtaining informed consent form and they evaluated by using the Jebsen taylor hand function test with seven subtest. The patients position should be in sitting and the therapist

should be in a standing or sitting and the total time taken for this test is about approximately 120 sec per subtest.

Method of measuring hand dysfunction with JTHFT

All subtest should will be administered precisely in the same manner to all subjects. The time taken to complete the subtest will be measure and recorded. Proper instruction should will be given to the patient about the procedure of test and ensure that they are understood by the subjects and make the individual comfortable, having good environment. The test will be done presented in the same sequence each task will performed in the same sequence and it will performed with each hand separately, non-dominant hand first.The subtest score is equal to time to complete the task by the individual, the total score was calculated by the sum of times of each subtest and this test is used to assess the speed, not the quality of performance

Subtest 1: Writing
The subjects are given with a black ball point pen and A4 sheets of unruled white paper, on the top of the other, to a clipboard. The sentence to be copied has 24 letters and this sentence is typed in both capital and small letters. then centered on a 5 to 8 inch index card, this card will be presented with the typed side faced down and then ask the patient to write that word showed by the therapist in index card and the same procedure is repeated with the dominant hand with a new sentence used with time consumption to complete the task.

Subtest 2: Card Turning
Place 3-5 inches card, in an horizontal row 5cm apart on the desk in front of the patient, and 5cm from the edge of the desk, the distance was measured using the tape, and then ask the subject to turn over the card when the therapist said to start, and then note the time that when last card have been turned over. Now do the same with the dominant hand.

Subtest 3: Picking Up Small Common Objects
An empty can is placed directly in front of the subject, 5 cm from the edge of the desk and two paper clips (oriented vertically), a regular sized bottle caps (placed with the inside of the cap facing up), 5 rupees coins and then safety pins were placed in a horizontal row to the left of the can. The

objects are 5cm apart. Ask the patient to pick up the objects and put in the can, and note the time until the sound of the last object striking inside of the can is heard. Now do the same with dominant hand

Subtest 4: Simulated Feeding
5 kidney beans were placed in the centre, parallel to and touching the upright on the board (a wooden 95 cm long and 29 cm width, 1 cm thick with the centre upright) 5 cm distance is needed between each A regular teaspoon is provided to take the beans and the time should be noted until the last bean is heard hitting the bottom of the can, this item is repeated with the dominant hand, the beans being placed on the right of centre.

Subtest 5: Checkers

Four standard sized wooden checkers are placed from front of the desk touching the board and ask the patient to arrange that one by one, the timing should be noted when the therapist said to start till the fourth checker contact with third, and then repeat this in right hand also.

Subtest 6: Lifting Large Light Objects

Place 5 empty cans in front of the board with distance speed 5cm apart with and the open end of the can should be placed

down. Then ask to lift the can and place on the board, timing should be noted and do the same with right hand.

Subtetst 7: Lifting Heavy Objects

Place 5 fully weighted (1 kg) can in front of a board from 12.5 cm clamped to the desk5cmapart and then ask the patient to lift that can and place on the board again, time taken to be noted and Now do the same with right hand

Statistical Analysis

All data are fed into the excel sheet for analysis. The scores were obtained for all subtest (both dominant and non-dominant hand) then the scores added to get the hand motor dysfunctional value for each individual. Then data analysis were done. Each score were converted into descriptive scores value for each computer professional. based upon the values and difference that high consumption of time taken by the individual were evaluated as having Hand Dysfunction. Overall scores was obtained by each summation of all the 7 subtest, pearson Chi-square test was used to test the association between outcome variables like age and gender. The SPSS VERSION 20 was used in this.

4. Result

Descriptive Statistic
Table 1: Mean and Standard deviation of all subtest

Subcomponents	N	Minimum	Maximum	Mean	Std. deviation
R writing	60	1.20	41.11	13.7337	6.70180
L Writing	60	15.46	40.84	25.9692	6.64122
R Card Turning	60	3	6	4.63	.928
L Card Turning	60	3.71	9.06	5.6490	.99100
R Small Common Object	60	3.46	11.04	5.2768	1.19185
L Small Common Object	60	3.91	66.48	6.7887	7.89195
R Stimulated feeding	60	3.30	13.41	7.2542	1.74422
L Stimulated feeding	60	3.80	15.10	8.5422	2.00392
R Checkers	60	3.04	9.33	4.3043	1.44613
L Checkers	60	3.30	497.00	13.0205	63.56385
R large light objects	60	3.01	5.91	4.0272	.77491
L large light objects	60	3.01	53.30	5.3682	6.34382
R Large heavy objects	60	3.00	33.72	4.9098	3.90504
L Large heavy objects	60	3.10	8.24	5.1950	1.16149
Age	60	21	38	29.60	5.083
Gender	60	1	2	1.47	.503
Valid N (list wise)	60	1	2	14.7	.503

This shows that the mean and standard Deviation of all subcomponents with minimum and maximum time consumption taken by the individual have been distributed for both right and left hand with the age group distribution is from the age of 60 (21, 38) and gender (1, 2).

Frequency

Age
Table 2: Age (%) distribution

	Frequency	Percent	Valid Percent	Cumulative Percent
21	1	1	1.7	1.7
22	4	4	6.7	8.3
23	3	3	5.0	13.3
24	5	5	8.3	21.7
25	4	4	6.7	28.3
26	5	5	8.3	36.7
27	2	2	3.3	40.0
28	4	4	6.7	46.7
29	2	2	3.3	50.0
31	3	3	5.0	55.5
32	7	7	11.7	66.7
33	3	3	5.0	71.7
34	3	3	5.0	76.7
35	6	6	10.0	86.7
36	3	3	5.0	91.7

| 37 | 2 | 2 | 3.3 | 95.0 |
| 38 | 3 | 3 | 5.0 | 100.0 |
| Total | 60 | 60 | 100.0 | 100.0 |

It shows that the age frequency of the individual have been taken, the hand dysfunction is present according to the age group wise is that described by the following curves. Valid percentile value of the age and gender distribution have showed the according to the number of persons and their value (%) according to the activities done by the patient and the indication of the hand dysfunction.

Gender
Table 3: Gender distribution

Gender Variance		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	32	53.3	53.3	53.3
	Female	28	56.7	46.7	100.0
	Total	60	100.0	100.0	100.0
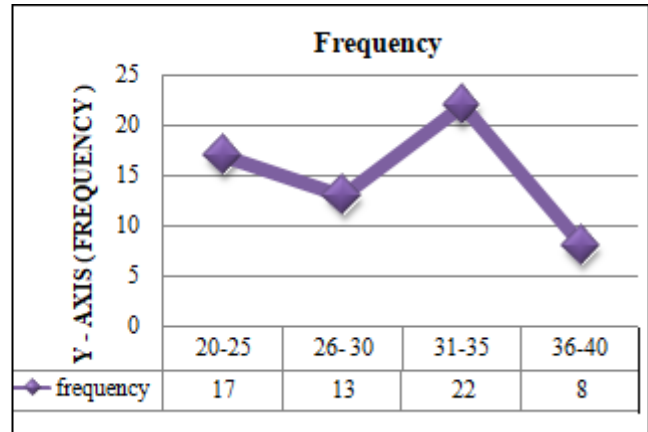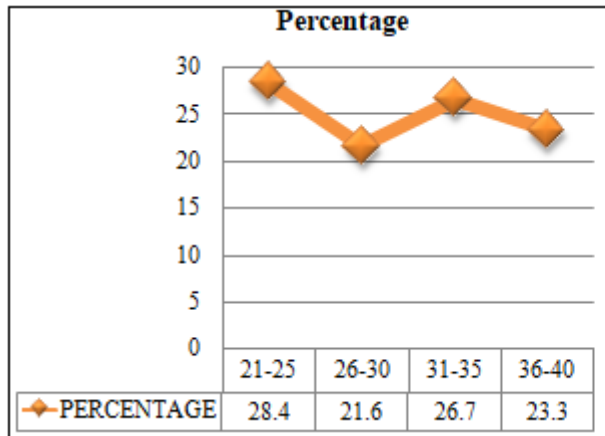
Graph 1: Represent the frequency and the number of peoples getting affected according to the age group

Then, Graph to shows about the percentile value of the peoples of having the symptoms of hand dysfunction from 21-25 (28.4%), 26-30 (21.6%), 31-35 (26.7%), 36-40 (23.3%).
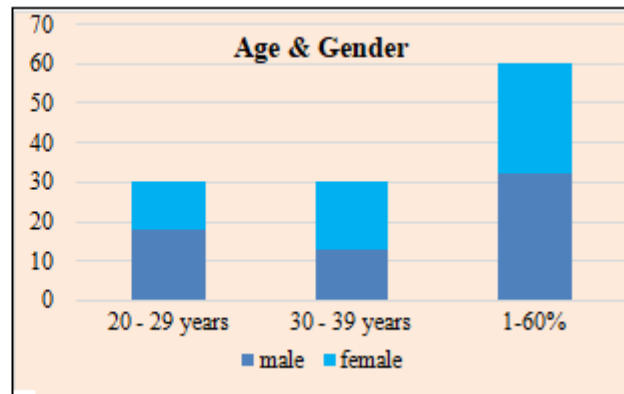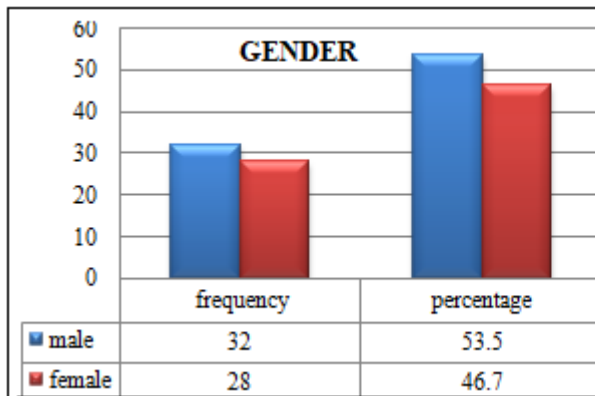
Graph 3: Represent the male and female with hand dysfunction and the overall percentage

And finally, the graph 4 indicates that the male and female range in each age groups (20-29 & 30-39) with the valid percentage of having 32.01% in the male and in female there was about 28.02%.there is no significative difference between the gender distribution but by the age it was getting changed.

5. Discussion

This study aims to rule identity the prevalence of hand dysfunction by using the Jebsen Taylor Hand Function Test in computer professionals in Puducherry region and to evaluate the HD, by using HTHFT

The total sample was taken as 60, among this in the age group of 30-3years were (53.3%) and 20-29 (46.7%), the male and female ratio was 32: 28, and the BMI were not taken in this study.

For each individual point scores (time consumption) were determined from 7 subtest and the score values were calculated in order to obtain the prevalence of HD of each category of age. Chi-Square test used to find the association between the outcome variables with age and gender

Table 1. shows the distribution of the all subtest and its mean, standard deviation and the Table 2. Shows that the age category wise prevalence in that, the most significantly affected age group was 31-39 and the number of valid cases

present were to be represented in the graph, with the percentile values also.chi square analysis shows there is no association between the gender, it becomes equally there for both.

Table 3. provides the total prevalence value of HD among the computer professionals, there was no association between the gender and overall HD in computer professionals.

Our study results showed overall hand dysfunction was (53.3%) it was correlated with Srilatha.S et al., there was the prevalence of hand and wrist oriented dysfunctioning will be 68.9% (P<0.0001) with the use of Quesionnaire and the sample size was 783.

However, this study does not shows any statistical association between hand dysfunction and gender but in Jebsen et., al founded that female individual were faster in hand writing, as well as for the picking up small objects subtest with both hands. And the advanced performance of the preferred hand more than the nonprefered hand in most tasks has been documented extensively. In addition, tasks that required a high level of fine dexterity (handle coins, and picking up and move small objects) may need precision and time more than that of gross hand function, when performed by the non-preferred hand and they also felt difficulty in writing with the left hand. In order to generalize the results in feature, study done with huge samples seems helpful.

6. Conclusion

This study was concluded that there was a prevalent of hand dysfunction among the computer professionals using the Jebsen Taylor Hand Function Test Puducherry region.

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