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Prevalence and individual risk factors of carpal tunnel syndrome in pregnant women

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ABSTRACT

Background: Prevalence of carpal tunnel syndrome (CTS) among pregnant women is very much common among the whole population. Due to rapid economic and social changes, an increasing trend of this disorder, as well as its individual risk factors, has also been observed in Pakistan. **Objective:** The present study aimed to find out the prevalence of CTS in pregnant women and to identify the risk factors associated with CTS in pregnancy. **Material & Methods:** Descriptive cross-sectional survey for the prevalence of CTS and a case-control study to find out the risk factors were administered on a sample of n=304 participants of pregnant women of Rawalpindi and Islamabad hospitals for six months from October 2016 to March 2017. Data was collected by non-probability convenient sampling through a self-structured questionnaire. The Association of risk factors was measured by odds ratio. **Result:** The present study showed the prevalence of CTS is 76(25%) based on Phalen's test and the prevalence of CTS is 86(28.3%) based on Tinel's test. History of CTS (OR=3.38) is the most common risk factor. Swelling (OR=2.74) is very common in pregnancy. Other factors including kidney disease, weightlifting, excessive household, cooking, and obesity, use of oral contraceptives, stress, smoking, sewing, diabetes, and thyroid dysfunction are also associated with CTS except for Rheumatoid arthritis, computer work and forceful gripping. **Conclusion:** This study showed significant results regarding the prevalence and risk factors of CTS among pregnant women in the hospitals of Islamabad and Rawalpindi.

Keywords: Carpal tunnel syndrome, Neuropathy, Numbness, Pregnant women, Tingling.

INTRODUCTION

Carpal tunnel syndrome (CTS) is the most common compression neuropathy that accounts for 90% of entrapment neuropathies [1]. 3.8% of the general population is affected by this disabling condition [2,3]. CTS affects 4-5% of the population mostly between the ages of 40 to 60 years [4]. The prevalence rate is 9.2% among females and 6% among males between the ages of 45 to 60 years [5]. The prevalence of CTS among pregnant women is reported differently in many studies [6]. One study reported the prevalence of CTS as high as 62% in almost all pregnant women in the third trimester [7,8]. Another study showed that among 100 pregnant women 19% had CTS. The prevalence in 1st, 2nd and 3rd trimester is 11%, 26% and 63% [9,10]. The incidence rate of CTS is higher [11].

Pregnancy is natural. Pregnant women experience many changes in the body during the gestational period. Previous studies have shown that the fluid retention and swelling that is common in pregnancy can lead to some medical conditions for example carpal tunnel syndrome [12,13]. The purpose of this study was to identify those risk factors that can cause CTS so that pregnant women will be able to prevent them.

Carpal tunnel is a rigid bony canal that is covered by a sheet of connective tissues, flexor retinaculum and it consists of carpal bones, 9 flexor tendons and a median nerve passes through it [14]. Due to any cause pressure over median nerve in carpal canal is increased and this increase in pressure leads to the compression of median nerve in carpal tunnel [15,16]. The median nerve innervates the thumb, index finger, middle finger and thumb side of ring finger and the flexors in forearm except for flexor carpi ulnaris [17,18]. When the median nerve is compressed, the nerve function is depressed because nerves are unable to receive sufficient nerve stimulation [19]. Disruption of nerve function can cause pain, numbness and tingling sensations in the distribution of median nerve [20]. It often awakens the patient from sleep due to needle-like sensations [21].

Different factors can cause CTS. It can be work-related or associated with other diseases [22]. Obesity, repetitive wrist ad handwork, external pressure, vibration, extreme wrist positions, pregnancy, oral contraceptives and rheumatoid arthritis can be the possible risk factors of CTS [23,24]. People who have BMI greater than 29 are at higher risk. Occupation related to CTS is very common among people. People who work on computer or work with vibratory tools that require a strong grip are also at higher risk [25]. Factors can be classified as intrinsic, extrinsic and neuropathic factors. Pregnancy, renal failure, hypothyroidism and use of oral contraceptives are extrinsic factors that can cause CTS. Intrinsic factors include tumors [26]. Neuropathic factors including diabetes and alcoholism can increase the possibility of CTS [27]. Diabetics are at higher risk of CTS [28][29]. The prevalence of CTS among workers of high repetitive work or jobs is 5.6% [30]. Pregnancy is another important risk factor as pregnancy is associated with swelling and fluid retention or edema that can cause swelling of the synovium which can ultimately lead to CTS. Symptoms that occur due to the compression of median nerve are pain, numbness and unpleasant tingling sensations [17]. Dull aching discomfort feels in hand, forearm and sometimes the upper arm. Tinel's test, Phalen's test, nerve conduction studies and Durkan's test is used to confirm the diagnosis of CTS. Treatment depends on the severity of the syndrome [8]. Those patients who are not suffering from severe symptoms are treated with conservative treatment. It includes wrist splints that stabilize the wrist in a neutral position and help to reduce the symptoms. Steroids and ultrasound are two other options [9]. If the conservative treatment does not resolve patient symptoms within 2-7 weeks then some other conservative or surgical treatment is recommended. This study is conducted to find out the prevalence of CTS in pregnant women and to identify the risk factors associated with CTS in pregnancy. No such study is found in previous literature as well. The present study aimed to investigate the prevalence of CTS in pregnant women and to identify the risk factors associated with CTS in pregnancy.

MATERIAL AND METHODS

Descriptive cross-sectional survey for the prevalence of CTS and a case-control study to find out the risk factors were administered on a sample of n=304 participants of pregnant women of Rawalpindi and Islamabad hospitals such as Shifa International hospital Islamabad, Al-Nafees medical college and Hospital Islamabad, Poly Clinic Hospital Islamabad, HIT Hospital Rawalpindi for six months from October 2016 to March 2017. All the participants were informed of the objectives of the study and informed consent was signed. Data of the participants were administered by non-probability convenient sampling through a self-structured questionnaire after the approval of the ethical committee of IIRS (ISRA Institute of Rehabilitation Sciences). The participants included were pregnant women of all age groups. Those women with a history of fracture and trauma to hands, with diagnosed de-Quervain's syndrome, multiple sclerosis, pronator syndrome and anterior interosseous nerve syndrome were excluded from the study. Some risk factors are more associated with the condition than others so the association was measured by odds ratio.

Statistical Analysis:

The data were analyzed by SPSS version 21.

RESULTS

In the current study total participants were n=377, calculated by RaoSoft for cross-sectional studies and 1:3 of this sample for case-control studies Among 304 participants,157(51.6%) were between 20 to 30 years of age, 127(41.8%) were between 20 to 30 years and 20 (6.6%) were greater than 40 years of age. For the factor of the month of pregnancy, among all the participants

of study 56 (18.4%), pregnant women were in the first trimester, 125 (41.1%) were in the second trimester and 123(40.5%) were in the third trimester as shown below in bar chart.

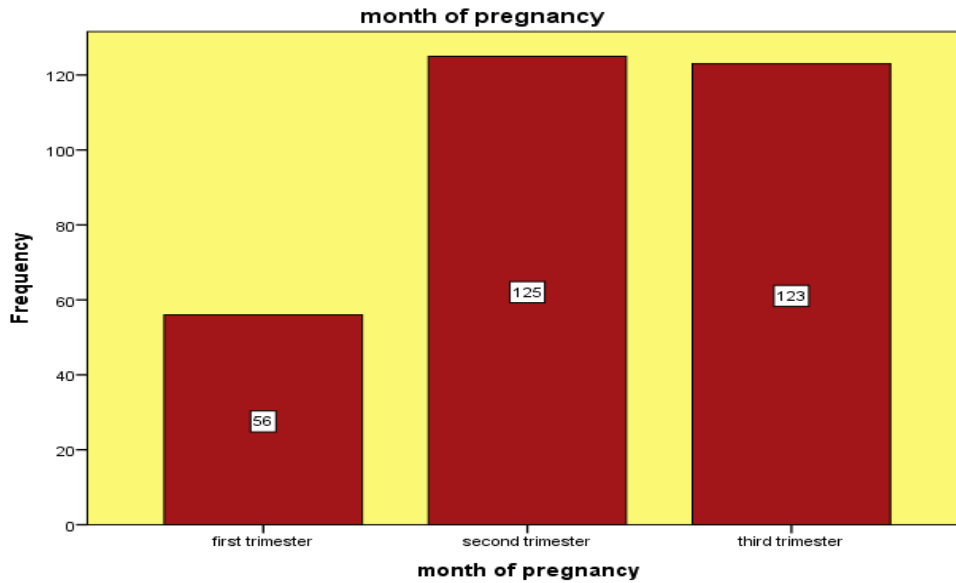


Figure 1. Frequency of month of pregnancy in CTS patients.

Regarding occupation, among 304 participants of the study,100(32.9%) were employed while 204(67.1%) were housewives. Regarding, the weight of 46(51.1%) participants was between 40 to 60 kg, the weight of 209(68.81%) participants was between 61 to 80 kg, the weight of 49(16.1%) participants was greater than 80kg as shown in pie-chart.

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The case-control study was done among 1:3 of 304 pregnant women who fulfilled the inclusion criteria to find out the risk factors. Risk factors with their odd ratios are detailed in table 1.

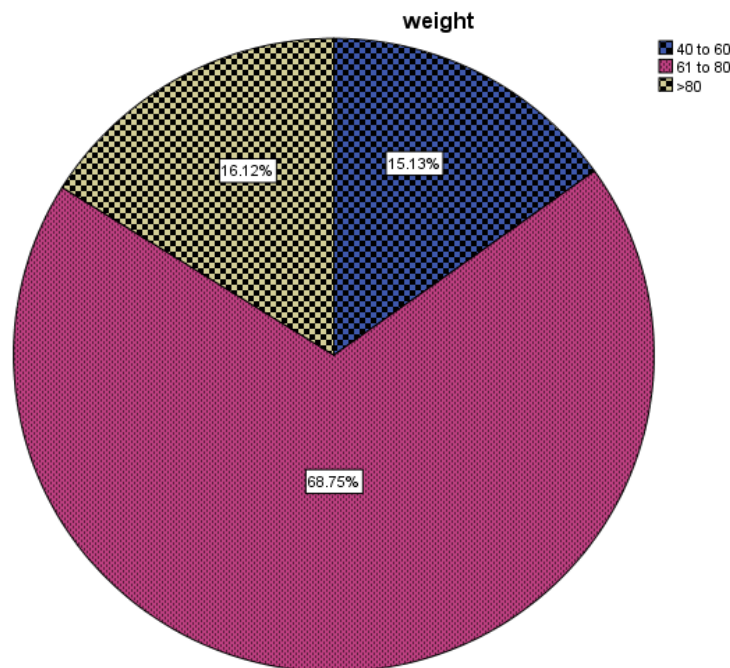


Figure2. Frequency of weight gain in CTS patients.

Table 1. Risk factors with their odd ratios of pregnant women with CTS.

Factors	No of cases exposed (a)	No of cases unexposed (c)	No of controls exposed (b)	No of controls Unexposed (d)	Odd ratios	95% Confidence Interval
CTS history	52	24	89	139	3.3839	1.9484 – 5.8771
Sleep on hand	60	16	129	99	2.8779	1.5629 – 5.2992
Swelling	50	26	94	134	2.7414	1.5938 – 4.7153
Weight lifting	45	31	89	138	2.2508	1.3256 – 3.8218
Kidney disease	22	54	46	182	1.6119	0.8918 – 2.9135
Excessive households	44	32	108	120	1.5278	0.9044 – 2.5810
Cooking	55	21	153	75	1.2838	0.7234 – 2.2786
Obesity	27	49	69	159	1.2697	0.7339 – 2.1968
Oral contraceptives	33	43	89	139	1.1986	0.7084 – 2.0280
Stress	41	35	113	115	1.1922	0.7085 – 2.0061
Smoking	7	69	18	210	1.1836	0.4743 – 2.9535
Sewing	7	69	18	210	1.1836	0.4743 – 2.9535
Diabetes	29	79	47	149	1.1637	0.6801 – 1.9915
Thyroid dysfunction	19	57	54	174	1.0741	0.5881 – 1.9617
Computer	4	72	14	214	0.8492	0.2708 – 2.6629
Rheumatoid arthritis	15	61	52	176	0.8323	0.4371 – 1.5848
Forceful griping	10	66	43	185	0.6519	0.3100 – 1.3708

DISCUSSION

This study was carried out to find out the prevalence and individual risk factors of CTS among pregnant women. Various risk factors were assessed among pregnant women such as obesity, swelling, diabetes, and history of CTS, kidney disease, stress, rheumatoid arthritis, oral contraceptives, excessive household, computer work, sewing, cooking, weight lifting, faulty positioning and thyroid dysfunction. Prevalence depends upon the criteria used for diagnosis and it is reported differently in many studies. The results of the study showed that the prevalence of CTS during pregnancy is 25% based on Phalen's test and 28.3% based on the Tinel test. The prevalence of CTS in our participants was lower than 62% found by Erik R Bergquist, Jeffrey A Cohen, Lance G Warhol. Almost similar results were shown by a previous study conducted by Zatel I Rozali, Faiz M Noorman, Prisca K De Cruz, Yam K Feng, Halimatun WA Razab, JamariSapuan, Rajesh Singh, Faizal M Sikkandar among 333 pregnant women [31,32]. The prevalence reported in this study was 24.6%. Another previous study conducted by F Baumann, G Karlikaya, G Yuksel, B Citci, G Kose, H Tirelireported the prevalence of CTS as 11% that was much lower than the results of our study [29,33]. A study conducted by SaeidKhosrawi, Raziye Maghrouri also showed a lower prevalence and it was 19% [27,34].

In this study, various risk factors were studied which showed that history of CTS, swelling, faulty position and weight lifting were strongly associated CTS among pregnant women. Results of our study showed that smoking (OR=1.18), obesity (OR=1.26), diabetes (OR=1.16) and thyroid dysfunction (OR=1.07) were associated with CTS, these results were similar to the study conducted by KARPITSKAYA Yekaterina, NOVAK Christine, MACKINNON Susan E to find the prevalence of smoking, obesity, diabetes and hypothyroidism in patients with CTS and showed that these factors were associated with CTS while smoking has little effect. Our study showed that rheumatoid arthritis (OR=0.83) was not associated while oral contraceptives (OR=1.19) and smoking (OR=1.18) was associated with CTS but a previous case-control study conducted by JM Geoghegan, DI Clark, LC Bainbridge, C Smith, R Hubbard showed that rheumatoid arthritis was associated with CTS while smoking and oral contraceptives were not associated. There is a huge difference between both studies. Our study reported obesity (OR=1.26) as a risk factor of CTS and similar results were shown by a previous study conducted by A Moghtaderi, S Izadi, NSharafadinzadeh. Results of this study showed that obesity is a possible risk factor for CTS (OR=1.75). Our study reported that excessive household, sewing and cooking, the faulty position of hand was associated with CTS and none of the studies was conducted to show the relationship of these factors with CTS. In patients with CTS, there is a limited activity of hand and wrist, proper physiotherapy can reduce complications.

CONCLUSION

In this study, the total number of participants were 304. All the participants were pregnant women of all age groups. History of CTS (OR=3.38) is the most common risk factor. Swelling (OR=2.74) that is very common in pregnancy, is also a common risk factor of CTS. Other factors including kidney disease, weight lifting, excessive household, cooking, obesity, use of oral contraceptives, stress, smoking, sewing, diabetes, thyroid dysfunction are associated with CTS. Rheumatoid arthritis, computer work and forceful

gripping are not associated with CTS. Like other countries, CTS is common in Pakistan. Lifestyle varies from person to person and this variation is associated with different risk factors. Moreover, risk factors for any condition cannot be the same for everyone, it may also differ. The duration of this study was six months which is less period, so it is highly recommended that further studies should be carried out on this topic and prevention of these risk factors so that pregnant women can prevent themselves from complications of the untreated condition.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

AS analyzed the data and revised the final version of the manuscript, RR helped in data analysis and drafting of the manuscript, TS helped in study design. SMZ helped in the critical revision of the manuscript, SS helped in the study design and data analysis.

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