ISSN No:-2456-2165

Relationship between the Different Variable and Neck Pain among Helmet Users

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Abstract:- A helmet is a form of protective gear worn to protect the head from injuries. The word helmet is diminutive from helm, a medieval word for protective combat headgear. Modern helmets are constructed from plastics. Premium price helmets are made with fiber glass reinforced with Kevlar or carbon fiber. They generally have fabric and foam interiors for both comfort and protection. Neck pain is becoming one of the common complaints identified by the helmet users in previous reports. It is due to combined weight of the helmet and their head. Few researchers identified there is no relationship of neck pain with helmets. The purpose of the study is to analyze the relationship between different variables with neck pain among helmet users. A correlative study design with 145 helmet users was randomly selected, self designed questionnaires were distributed to them, around 118 samples were taken for the analysis after due consideration of the selection criteria. Variables used in the study were kilometers travelled with helmet, different brands, alteration of the helmet and types of helmet. All the questionnaires were analyzed using descriptive statistical method using SPSS 20.0. Chi square correlation was used for analysis. The result of this study shows that using helmet with local brands and those who travelled more than 40 kms per day had a strong relationship with neck pain, other variables are not much correlated This study concludes that there was a significant positive correlation found in different brands and kilometers driven with neck pain. On the other hand, there was a significant negative correlation found in different types, alteration and size.

Keywords:- *Helmet, Neck Pain, Helmet Type, Helmet Model, Helmet Brand.*

I. INTRODUCTION

Motorcycles are one of the most popular vehicles in the India, and their use has been rapidly increasing. Around 72% registered vehicles in India are motor cycles in 2012. India as proposed a national helmet law that makes helmet use mandatory for motorcycle drivers. Therefore, recognizing the importance of helmet use in reduction of fatalities increased the implementation of helmet laws in different countries [1]. In spite of the obvious benefits of helmet use by motorcyclists, unfortunately people have no interest in wearing a helmet. One of the main reason, for this is due to discomfort around the head and neck. Few other commonest reason for not wearing a helmet were the weight of the helmet (77%), and other reasons were the feeling of heat during helmet use (71.4%), neck pain (69.4%) [2].

Neck pain is due to combined weight of the helmet and head, the neck become mechanically stressed beyond its capacity. With average head weight of 8-12 pounds, and average helmet coming in at around 4 pound, this amount of weight can overcome even a healthy neck with a hard riding [3]. A poor fit helmet adds further more stress to the neck. Too heavy helmet could produce spasm of muscles around the neck. Some helmet users complain about discomforts on wearing helmets, studies suggests that interior modification can help in relieving the discomfort. Weight and shape of the helmet may contribute to motorcyclists breaking their neck during accidents. However, there are very few studies were done on neck pain with helmet users. So this study is to find out the relationship of different variables of helmet users with neck pain.

II. METHODOLOGY

A correlative study design was conducted in the college campus where over 500 motorcycles were parked daily for the office work. Participants were approached individually by the team of researchers and explain about the study briefly, those who are willing to accept for the study were selected and a questionnaire were given to them in the college OPD. The self reported questionnaire was created by the researchers with the help of experience stalwarts who work in epidemiological studies. The first part of the questionnaire includes the demographic data and the second part includes the questionnaire pertain to the details of the helmet which they are currently wearing and the musculoskeletal symptoms. 145 helmet users was randomly selected, self designed questionnaires were distributed to them, around 118 samples were taken for the analysis after due consideration of the selection criteria which includes motorcycle riders, both genders, volunteers who wears helmet regularly, has to wear helmet at least 4 hours in a day, has to travel at least 10 kms in a day and who doesn't suffer with any recent musculoskeletal problems, No congenital abnormalities around the neck and people who rides normal bikes or scooter. Each day 10 volunteers were selected a brief

ISSN No:-2456-2165

introduction about the study was given to them after obtaining the consent the self designed questionnaire was given to all the volunteers by the research assistant and has given 30 minutes to fill up the questionnaires. Following that the questions were collected and a thank you note was given to all the participants. All the questionnaires were analyzed using descriptive statistical method by SPSS 20.0.Chi square correlation was used for analysis**.**

III. RESULT

Types of Helmets	Pain Present	Pain Not Present	No of Participants
Half Helmet	14 13.73 (0.01)	16 16.27 (0.00)	30
Modular Helmet	5 5.95 (0.15)	8 7.05 (0.13)	13
Open Face Helmet	5 9.15 (1.88)	15 10.85 (1.59)	20
Full Face Helmet	9 8.24 (0.07)	9 9.76 (0.06)	18
Dual Sport	21 16.93 (0.98)	16 20.07 (0.82)	37
	54	64	118

Table 1

$\chi 2 = 5.695$, $df = 4$, $\chi 2/df = 1.42$, $P(\chi 2 > 5.695) = 0.2231$

Since the P-value (0.2231) is more than the significance level (0.05), we accept the null hypothesis.

Helmet Brands	Yes	No	No of Participants
Vega	5 11.19 (3.42)	17 10.81 (3.54)	22
Studds	5 6.10 (0.20)	7 5.90 (0.21)	12
Steelbird	5 5.59 (0.06)	6 5.41 (0.07)	11
Aerostar	8 8.14 (0.00)	8 7.86 (0.00)	16
Wrangler	5 6.61 (0.39)	8 6.39 (0.41)	13
Local	32 22.37 (4.14)	12 21.63 (4.29)	44
	60	58	118

Table 2

$\chi 2 = 16.724$, $df = 5$, $\chi 2/df = 3.34$, $P(\chi 2 > 16.724) = 0.0051$

Since the P-value (0.0051) is less than the significance level (0.05), we reject the null hypothesis.

ISSN No:-2456-2165

No of Kilometers driven per day	Pain Present	Pain Not Present	No of Participants
10KM	10 11.23 (0.13)	15 13.77 (0.11)	25
10-20KM	9 17.52 (4.14)	30 21.48 (3.38)	39
20-30 KM	10 9.88 (0.00)	12 12.12 (0.00)	22
40 KM	24 14.37 (6.45)	8 17.63 (5.26)	32
	53	65	118

Table 3

$\chi 2 = 19.471$, $df = 3$, $\chi 2/df = 6.49$, $P(\chi 2 > 19.471) = 0.0002$

Since the P-value (0.0002) is less than the significance level (0.05), we reject the null hypothesis.

Alteration of helmet	Pain Present	Pain Not Present	No of Participants
alt yes	32 34.78 (0.22)	44 41.22 (0.19)	76
alt no	22 19.22 (0.40)	20 22.78 (0.34)	42
	54	64	118

Table 4

$\chi 2 = 1.151$, $df = 1$, $\chi 2/df = 1.15$, $P(\chi 2 > 1.151) = 0.2834$

Since the P-value (0.2834) is more than the significance level (0.05), we accept the null hypothesis.

Size of the helmet	Pain Present	Pain Not Present	No of Participants
Med	28 26.00 (0.15)	31 33.00 (0.12)	59
Large	13 14.98 (0.26)	21 19.02 (0.21)	34
X Large	8 8.81 (0.08)	12 11.19 (0.06)	20
XX large	3 2.20 (0.29)	2 2.80 (0.23)	5
	52	66	118

Table 5

$\chi 2 = 1.393$, $df = 3$, $\chi 2/df = 0.46$, $P(\chi 2 > 1.393) = 0.7071$

Since the P-value (0.7071) is more than the significance level (0.05), we accept the null hypothesis.

IV. DISCUSSION

Neck pain is a common disorder prevailing among individuals of different population. This study hypothesized that helmet usage was related to neck pain and also hypothesized that there are different variables in wearing helmet correlates with neck pain. Helmet is a protective gear and it is compulsory in India to wear helmet while driving two wheelers [4]. It acts as a life saving equipment. Wearing helmet is the most effective way in reducing head injuries and also decreases the risk of severity of injury among motor cyclists [5].

Studies have identified that wearing helmet for longer duration produces fatigue in the paraspinal muscles which may lead to weakness and pain. Helmet also causes restriction on neck movements which could influence the neck and produce pain over the neck region. The neck muscles works against gravity will undergo undue tension which could results in early fatigue of the muscles and leads to neck injuries [5].

In this study the Table I show that there is a negative correlation between the different types of helmet with the neck pain. 54 individuals out of 118 complain of neck pain while using helmets, however there was no significant relationship was obtained between the various types of helmet.

Analyses of the different brands of helmets influence on neck pain are shown in Table II. This table shows that there is a positive correlation between the brands. Local made helmets possess high significance of neck pain than the branded one.

An analysis of the number of kilometers driving with the use of helmets was taken and is shown in table III. Riding the bike with the helmet for longer distance shows a positive correlation. The number of kilometers driven has influence on pain.

Alterations in the helmet and their influence on neck pain were studied in the table IV. This study shows there was negative correlation between the alterations of helmet with neck pain. Although 54 individuals out of 118 individuals stated that they have altered the helmets but the results shows there was no much significant changes in the alterations with neck pain.

Table V shows that there is a negative correlation on the size of the helmet with the neck pain. Using the different size of the helmet there was only 52 individual's complaint of neck pain out of 118. Most of the individuals wore medium sized helmets.

Poorly designed helmets could cause increase peak force in the neck with cumulative loading which was demanded extreme neck postures to compensate [6]. Helmets could increase the activation of the dorsal musculature of the neck and raise the potential for the muscle fatigue and thus increasing the risk of injury [7].

Similar studies have done on the biomechanical analysis that when there is an increase of load in the cervical spine, which produce increase forward bending of neck. Increase in biomechanical stress followed by the forward head posture becomes a cause of musculoskeletal problem in the neck like head ache TMJ dysfunction and neck pain [8]. Similar studies have reported that the wearing of helmet has cause obstruction of vision, neck pain, hearing problems, headaches and heaviness [9].

V. CONCLUSION

This study concludes that there was a significant positive correlation found in different brands and kilometers driven with neck pain. On the other hand, there was a significant negative correlation found in different types, alteration and size. A future study on detail evaluation of the helmet usage and the pain should be done with large number of volunteers. The work posture, bike conditions and the health status are not considered in this study. Future study needs to be done with a detail evaluation.

ACKNOWLEDGEMENT

The authors sincerely thanking Dr. G. Bakthavathsalam, Padmashree Awardee & Chairman, Mrs. Vasanthi Ragu, Vice Chairman, Mrs. Vaijeyanthi M Das, CEO, Mr. Prabhu Kumar, CEO, and Prof V. Mohan Gandhi, CEO, KG Hospital, Coimbatore. India., for their support and logistical help to conduct this research.

REFERENCES

[1]. Global status report on road safety 2015, World Health Organization, Geneva (2015)
[2]. Motorcycle helmet use and injury outcome and hospitalization costs from crashes in Washington State. Rowland J, Rivara F, Salzberg P, Soderberg R, Maier R, Koepsell TAm J Public Health. 1996 Jan; 86(1):41-5.
[3]. Branfoot T. Motorcyclists, full-face helmets, and neck injuries: can you take the helmet off safely, and if so, how? J Accid Emerg Med.1994;11:117-120.
[4]. Maheshwari R. Bongoni., Leena Zore, Priyanka Honkalas and Ajay Kumar. Prevalence of Neck Pain in Quick Service Provider Helmet Users Using Neck Disability Index, International Journal of Current Advanced Research, 2018:07(9), pp. 15564-15566.

[5]. Senthilnathan CV. Gurulakshmi A.,Mohan Kumar G Effects of isometric neck exercises in improving cervical range of motions in long time helmet wearers. TJPRC: International Journal of Physiotherapy & Occupational Therapy (TJPRC: IJPOT) Vol. 1, Issue 1, Jun 2015, 9-16
[6]. Kim JH, Kim JG, DO KS, Yim J. The effect of applying a head-weight device on cervical angle and pain of neck muscles.Phys Ther Rehabil Sci 2016, 5 (2), 101-105
[7]. Wadhwaniya S, Gupta S, Tetali S, Josyula LK, Gururaj G, Hyder AA. The validity of self-reported helmet use among motorcyclists in India. WHO South-East Asia J Public Health 2015; 4(1): 38–44.
[8]. Lau HM, Chiu TT, Lam TH. Measurement of craniovertebral angle with electronic head posture instrument: criterion validity. J Rehabil Res Dev. 2010;47:911-8.
[9]. Patel R, Mohan D. An improved motorcycle helmet design for tropical climates. Appl Ergon. 1993;24:427–31.