Quest Journals
Journal of Medical and Dental Science Research
Volume 5~ Issue 5 (2018) pp: 50-52
ISSN(Online) : 2394-076X ISSN (Print):2394-0751
www.questjournals.org

Research Paper

Role Of Helmets In Preventing Head Injury In Jharkhand: Case-Control Study.

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ABSTRACT:*The main aim of this study isto examine the risk of injury to the head and the effect of wearing helmets in road side accidents among persons of jharkhand.This is acase-control study by questionnaire completed by the victims and their carers.This study was performed in Rajendra Institute Of Medical Sciences Ranchi Jharkhand India During The Period of February 2016 to January 2018.In this study we have taken890persons presenting with motorcycle related injuries during February 2016 to January 2018. The cases comprised 204persons who had sustained injury to the upper head including the skull, forehead and scalp or loss of consciousness. The controls were 556motorcyclists presenting with injuries other than to the head or face. A further 130persons with injuries to the face were considered as an extra comparison group.Most persons (460) were injured after losing control and falling from their motorcycle. Only 62 had contact with another moving vehicle. persons with head injury were significantly more likely to have made contact with a moving vehicle than control persons. Head injuries were more likely to occur on paved surfaces than on grass, gravel, or dirt. Wearing a helmet reduced the risk of head injury by 63% and of loss of consciousness by 86%.The risk of head injury in motorcycle accidents is reduced among persons wearing a helmet. Current helmet design maximises protection in the type of accident most commonly occurring in this study. Legislation enforcing helmet use among persons should be considered.*

KEYWORDS:*Helmet,Motorcycle,Jharkhand*

R*eceived 13 October, 2018; **A**ccepted 29 October , 2018 © The author(s) 2018. **P**ublished with open access at **www.questjournals.org***

I. INTRODUCTION

Motorcycle injuries are one of the main reasons for presentation to Neurosurgery emergency departments in RIMS Ranchi Jharkhand.In Brisbane, Australia admission to hospital and death from motorcycle related trauma are usually due to head injury.(1)Several studies of motorcycle safety helmets report an associated reduction of head injuries,2,3 and in the only case-control study the risk of head injury was significantly reduced if a helmet was worn.**(3)**Wearing a Helmet for two-wheeler drivers is a statutory requirement under the Motor Vehicles Act, 1988 in india. The helmet must conform to the ISI standards and should bear the ISI mark.We examined the risk of upper head injury or loss of consciousness associated with helmet wearing.

II. MATERIALS AND METHODS

This study was carried out at Rajendra Institute Of Medical Sciences Ranchi Jharkhand India which is the largest institute in Jharkhand state of india. We also carried out daily checks of triage books, patient presentation lists, and hospital wards, as well as computer searches of hospital records. Eight hundred and ninety persons had motorcycle related injuries during the study period. A search of death certificate files showed one death of a cyclist who had not presented to the reference hospitals and was not therefore included in the study. Data collection started two and a half months before wearing helmets became compulsory (108Persons). The case group comprised the 204 children with injuries to the upper head area, the region potentially protected by a bicycle helmet, including injuries to the skull, forehead, and scalp or loss of consciousness. To determine the protective effect of helmets against loss of consciousness, a subgroup of 82persons who lost consciousness was considered separately.

The control group consisted of the 556 cyclists who were treated for injuries other than to the upper head or face. The 130Persons with injuries to the face were used as an additional comparison group. Assuming a two sided hypothesis and available data on 204 cases and 556 controls the relative odds of a head injury of at least 2.0 among non-helmet wearers would be able to be detected at 95% significance with 80% power, assuming that 47% of controls wore helmets.

A self administered questionnaire was completed by the persons and his or her carer. Information was recorded on the factors leading to the accident, including bicycle malfunction, riding incorrectly, poor road conditions (for example potholes), avoiding objects including pedestrians, and contact with other moving or stationary objects. The surface on to which the child fell was also recorded. The degree of damage to the motorcycle was used as a proxy to assess severity of impact.**(3)**

Injuries were defined by the clinician using a standard Queensland injury surveillance prevention project form. Ownership and use of a motorcycle helmet at the time of the accident were recorded.
Non-responders were followed up within three weeks of the injury. In a concurrent repeatability study, we reinterviewed a random sample of 30 subjects by telephone within three weeks of the initial self administered questionnaire. The data were found to be almost identical for all variables.

The relation of injuries to the upper head or loss of consciousness to helmet wearing and other variables was investigated by X2 contingency tests. To produce final risk estimates, unconditional logistic regression models of the log odds of injury to the upper head or loss of consciousness were adjusted for the potential confounding effects of sex, age, hospital, parental education, the main cause of the accident, contact with a moving vehicle or a stationary object, and the severity of the impact based on the repair needs of the bicycle.**(4)**

Controls could have been less likely to hit their heads in the accident.**(3)** We therefore also compared the 204persons with injuries to the upper head (the case group) to a second control group of 130persons with injuries to the face but no concurrent injury to the upper head, as both groups had struck their head in the accident.

As per details from Census 2011, Jharkhand has population of 3.3 Crores, an increase from figure of 2.69 Crore in 2001 census. Total population of Jharkhand as per 2011 census is 32,988,134 of which male and female are 16,930,315 and 16,057,819 respectively. In 2001, total population was 26,945,829 in which males were 13,885,037 while females were 13,060,792.(5)
Total number of registered two wheelers in jharkhand state up to 2013 is 2248511.

III. RESULTS

Three quarters of those injured in motorcycle accidents were Males. This proportion was also reflected among Persons with upper head injury and those who lost consciousness. Age was not significantly associated with upper head injury. More than half of injuries were reported to be caused by faulty riding, and 92 resulted from a faulty motorcycle. Contact with another moving vehicle was reported by 62persons. Significantly more persons with upper head injury ($P<0.001$) had accidents involving contact with another moving vehicle . More il confounding effects. We did not adjust for the surface on which the person fell as the data merely reflected responses to contact with a stationary object. Risk of injuries to the upper head wanjuries to the upper head occurred when the persons fell on paved surfaces than on gravel, dirt, or grass ($P=0.012$). Bicycles belonging to children who had sustained an upper head injury were significantly more likely to require repair than those belonging to controls ($P<0.001$), and a larger proportion were beyond repair in the group who lost consciousness compared with the controls ($P<0.001$).

The crude protective effect of wearing a helmet against upper head injuries remained after adjustment for potentias 2.7-fold (95% confidence interval 1.5 to 4.9) higher among non-helmet wearers than among helmet wearers. For loss of consciousness the risk was 7.3-fold higher (2.6 to 20.4) among non-helmet wearers than among helmet wearers. This translates to a reduction in risk among helmet wearers of 63% for upper head injuries and 86% for loss of consciousness.

Sixty six (51%) of the 130persons who had an injury to the face but not concurrent injury to the upper head were wearing a helmet. When these persons were used as a control group the reduction in risk of injury to the upper head among helmet wearers was 51%.

IV. DISCUSSION

Helmet wearing was significantly associated with a reduced risk of upper head injury and loss of consciousness. The reduction in risk persisted after adjustment for the confounding effects of age, sex, the main cause of the accident, contact with other objects including motor vehicles, the road surface, and the severity of damage to the bicycle.

The controls used in this study were similar to the emergency room controls used by Thompson et al.[3] They reported a significant increase in risk of upper head injury and loss of consciousness for those not wearing helmets compared with the population based on the emergency room control group. The point estimates in the present study were consistent with the findings for the emergency room control group of Thompson et al.[3] An emergency department control group has some limitations. Although the legislation enforcing helmet wearing in jharkhand did not include penalty provisions during the study, persons not wearing helmets who had a minor head injury may have been less likely to present to hospital. This would underestimate the effectiveness of helmets. We believe such a bias is unlikely, particularly among persons needing admission to hospital for loss of consciousness. Other sources of selection bias relating to the emergency department control group have been discussed by Thompson et al,[3] but are unlikely to affect the direction of the result. For example, motorcyclists who had not attended hospital after striking but not injuring their head when wearing a helmet would strengthen the observed association between helmets and a reduced risk of upper head injury had they been included in the study. Similarly, reduction in the estimated risk of upper head injury would have been greater if motorcyclists wearing helmets who did not have head injuries were more likely than non-helmet wearers to attend hospital.

When the analysis was restricted to persons who had hit their head in the accident, the reduction in risk associated with helmet wearing was similar to that found for the sample as a whole. This suggests the reduction in risk of upper head injury was not due to cases having accidents which were more likely to damage the head. We did not directly measure risk taking behaviour, an important potential confounding variable for motorcycle related injuries. However, the study population was limited to persons who had been injured in a motorcycle accident. We surmise that this group, regardless of site of injury were more likely than the general population to be risk takers. Confounding was controlled at least in part by this restriction. In addition we adjusted for factors potentially related to risk taking including sex, type of accident, its severity, and the involvement of another moving vehicle.

The association between wearing helmets and reduced risk of head injury among motorcyclists is now compelling. The high level of compliance with recent helmet wearing legislation[(6)] is likely to help reduce further the incidence of motorcycle related head injury.[(7)]

The crucial question not answered by this study is whether there is a cause and effect association or whether influences leading to non-helmet wearing are associated with other risk taking behaviour. Prospective cohort studies in populations with high compliance with compulsory helmet wearing will give insight into these issues.

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