イタルダ インフォメーション

ITARDA INFORMATION

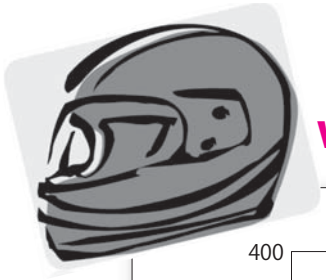
交通事故分析レポート

No.102

Special feature

Reduction in moped accidents and alleviation of damages

~Always confirm safety at intersections and wear chest protectors~



Fatalities due to head injuries have declined whereas fatalities due to chest injuries have not!

Trend in Class-1 moped fatalities by body part mainly injured

Let's wear helmet correctly to protect our heads!
Let's take initiative in wearing the chest protectors as well!

❶ Introduction

■Lately, no decline is seen in fatalities due to Class-1 Moped*1 accidents

Fig.1 shows the trend in fatalities (all motorcycle occupants within 24 hours of the accident) by mode of transportation from the year 2003 through 2012, based on the Road Traffic Accident Statistics by National Police Agency. Fatalities are on the decline for all modes of transportation.
However, Figure 2 shows that among motorcycles, fatalities (all motorcycle occupants within 24 hours of the accident) are more in case of Class-1 mopeds. Fatalities of class-1 moped riders have been on the decline from 2004 through 2009, but beyond that there has not been much reduction. Why there has not been any decline in fatalities of class-1 moped riders lately?
In this issue, we shall analyze the fatalities and composition ratio of class-1 moped accidents and in view of those characteristics observed we shall try to device measures for the prevention of such accidents, together with the measures to alleviate damages.

*1 Including motorcycles (total displacement) such as class-1 mopeds (50cc or less), small motorcycles (over 250cc), light motorcycles (over 125cc and below 250cc) and class-2 mopeds (over 50cc and below 125cc).

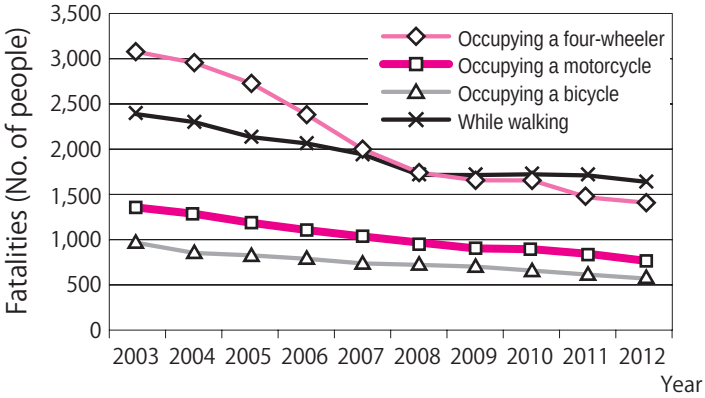


Fig.1: Trend in fatalities by mode of transportation

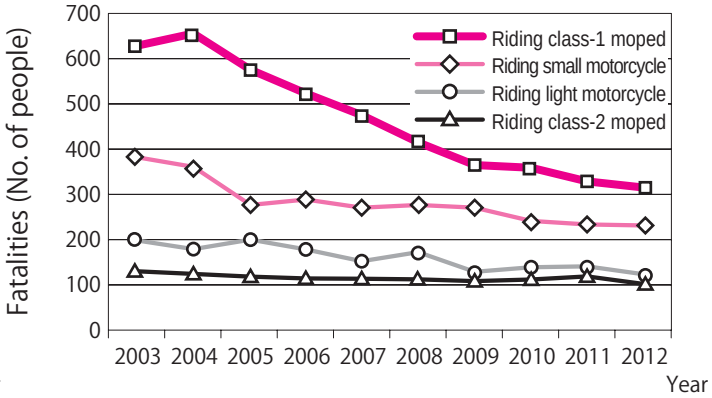


Fig.2: Trend in fatalities by type of motorcycles

❷ Number of registered motorcycles

■Number of registered Class-1 mopeds are on the decline

Figure 3 shows the trend in number of motorcycles registered*2 by their type. Whereas class-2 mopeds, small and light motorcycles exhibit slight increase or no difference over the years, the number of class-1 mopeds registered has reduced to 6,899,459 vehicles in 2012 from 8,915,037 vehicles in the year 2003, a reduction of 2,015,578 vehicles.

*2 1) Based on Ministry of Land, Infrastructure and Transport's statistical data, "Monthly report on number of registered motorcycles starting from 2003, as of end of December, 2012."
2) Based on Ministry of Internal Affairs and Communications' data, "Number of registered mopeds etc. starting from 2003,as of April 1, 2012."

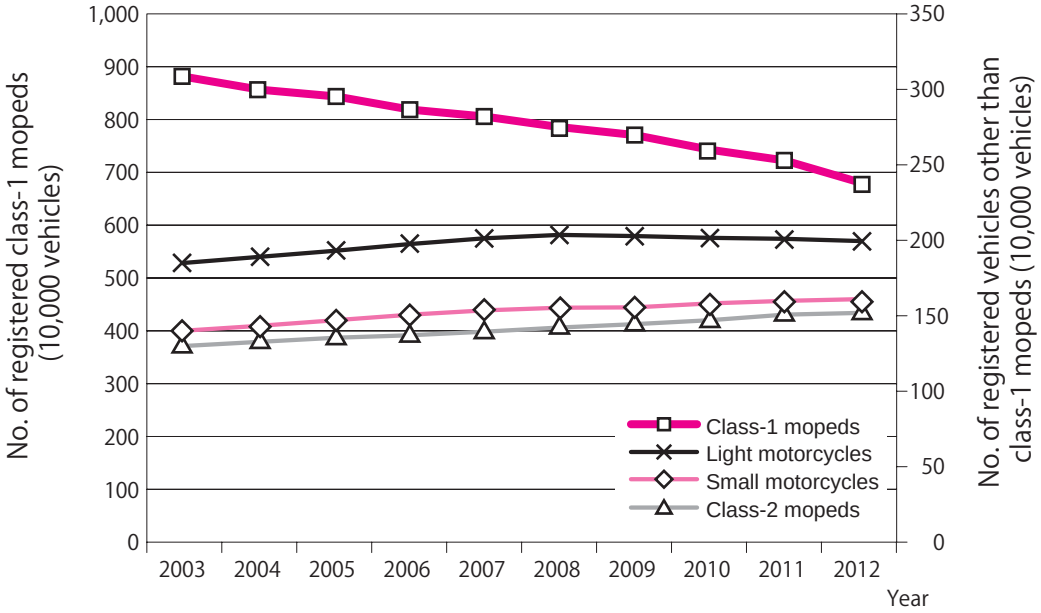


Fig.3: Trend in the no. of registered motorcycles by their type

❸ Characteristics of Class-1 moped accidents

■Class-1 moped accidents claim elderly lives more often, a trend still prevailing in recent years.

Fig.4 shows the fatalities (cumulative total from 2003 to 2012 of all motorcycle occupants within 24 hours of the accidents) from motorcycle accidents by age group and by the type of motorcycles. Whereas fatalities related to small and light motorcycles comprise mainly of younger riders, the trend shows a decline in fatalities with the increase in age group. However, unlike other motorcycles, fatalities are more among the younger 16-24 group and the elderly group in case of class-1 mopeds.
Fig.5 shows the trend in fatalities (all motorcycle occupants within 24 hours of the accidents) for class-1 mopeds by age group.
A steady decline in fatalities can be seen among the younger group of 16-24, while there is no reduction in the elderly fatalities over 65, beyond the year 2009. Hence, if the fatalities of elderly riders which accounts for more class-1 moped fatalities do not show a decline, it will affect the slowdown of class-1 moped fatalities. Let us now observe the characteristics of elderly fatalities in class-1 moped accidents.

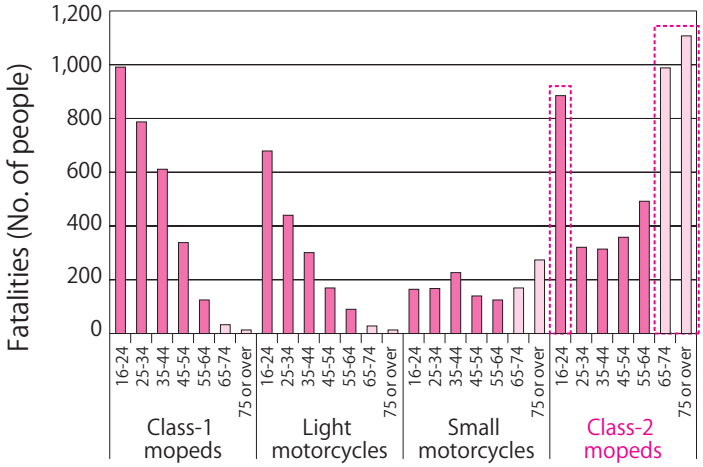


Fig.4 Fatalities by the type of motorcycle and by age group (Cumulative total from 2003 to 2012)

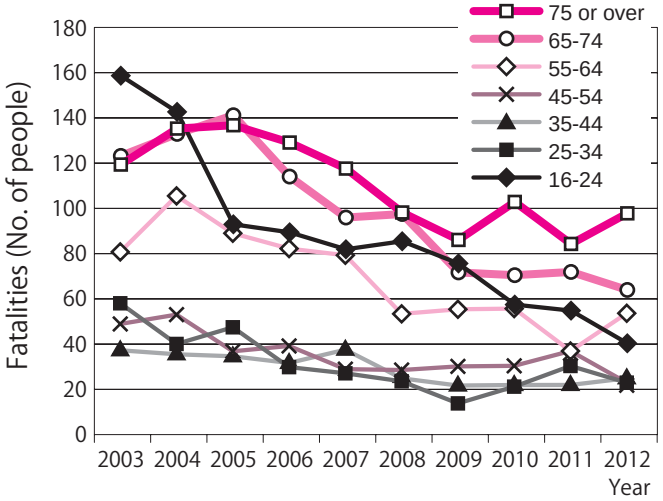


Fig.5 Trend in class-1 moped fatalities by age group

■Watch out for crossing collisions at intersections

Hereafter, let us analyze the class-1 moped accidents in terms of comparison between the two age groups of 65 or over and 64 or under.
Fatalities (cumulative total from 2003 to 2012 of all motorcycle occupants within 24 hours of the accidents) by the type of road configuration, are more at intersections and crossing collisions result in more fatalities when compared by the type of accident. (Fig.6 and 7)
Looking by age group, fatalities are more among the elderly group of 65 or over. Moreover, among this age group, fatalities resulting from vehicle-to-vehicle collisions while turning right and collisions with electric poles, sign posts etc. are lesser as compared to 64 or under. Hence, riders should be cautious about crossing collisions at intersections which lead to fatalities more often.

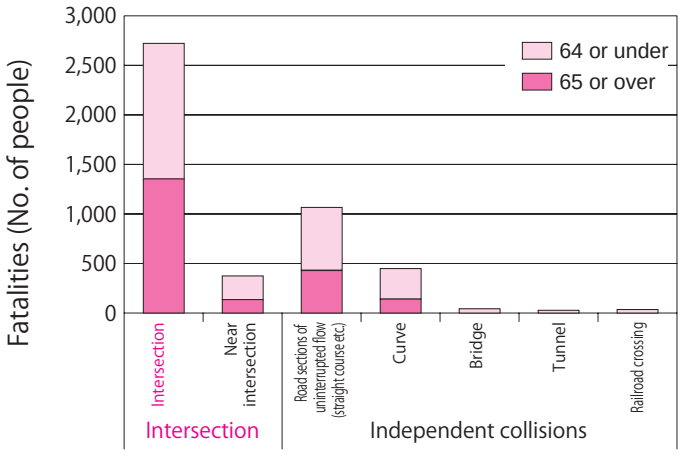


Fig.6 Class-1 moped fatalities by type of road configuration and age group (Cumulative total from 2003 to 2012)

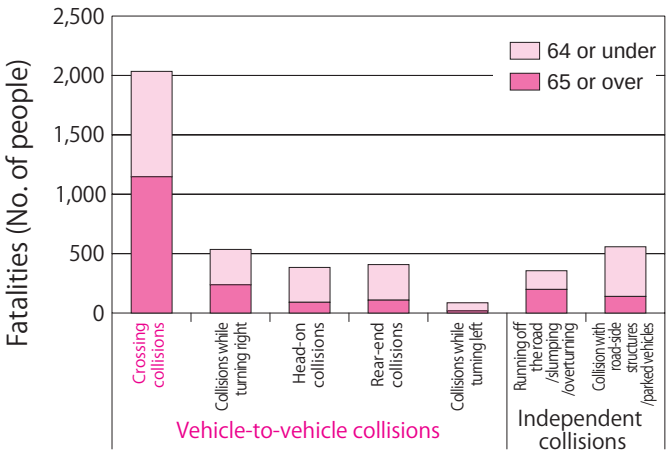


Fig.7 Class-1 moped accidents by type of accident and by age group (Cumulative total from 2003 to 2012)

■Failure to confirm safety and to stop temporarily cause accidents

Fig. 8 shows the fatalities (cumulative total of only drivers from 2003 to 2012 within 24 hours of the accidents) due to crossing collisions at intersections by human errors. While failure to confirm safety is the predominant cause, elderly riders of 65 or over account for the majority of such fatalities.
Fig.9 shows the fatalities (cumulative total of only drivers from 2003 to 2012 within 24 hours of the accidents) due to crossing collisions at intersections by the type of traffic violations committed. Apparently, violation of traffic rules like failure to stop temporarily etc. and duty to confirm safety at intersections before proceeding etc. account for more fatalities while 60% of violations of traffic rules like failure to stop temporarily etc. are committed by elderly riders aged 65 or over.

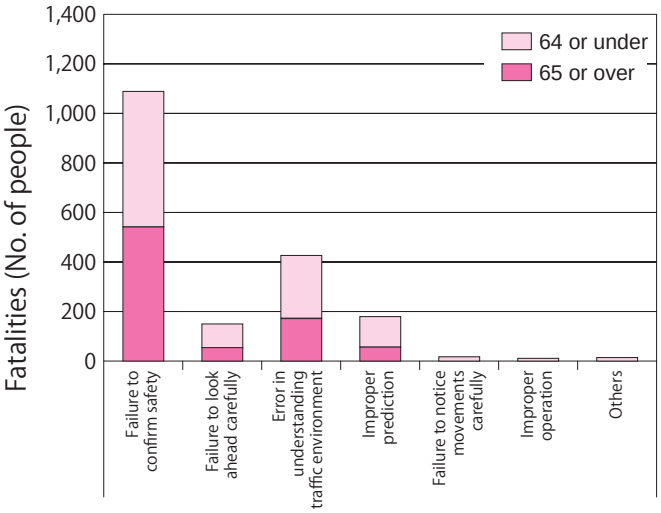


Fig.8 Class-1 moped fatalities by type of human errors and by age group (Cumulative total of crossing collisions at intersections from 2003 to 2012)

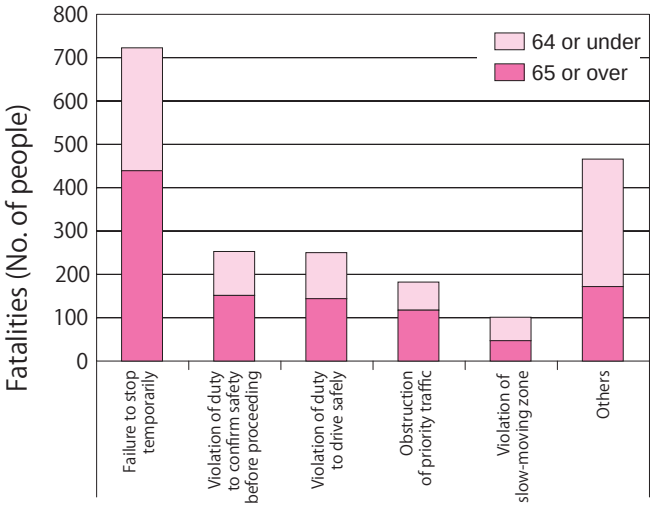


Fig.9 Class-1 moped fatalities by type of traffic violations and by age group (Cumulative total of crossing collisions at intersections from 2003 to 2012)

■Head and chest are the body parts injured

Which parts of the body are mainly injured during accidents?
Fig. 10 shows fatalities (cumulative total from 2003 to 2012 of all motorcycle occupants within 24 hours of the accidents) by the body parts mainly injured. Head and chest injuries are predominant.
Fig.11 shows the trend in fatalities (all motorcycle occupants within 24 hours of the accidents) by the body parts mainly injured. Although head injuries accounts for the majority of fatalities, it has reduced drastically over the past 10 years. Following in number is the fatalities due to chest injuries, which however do not show any significant decline in the trend.

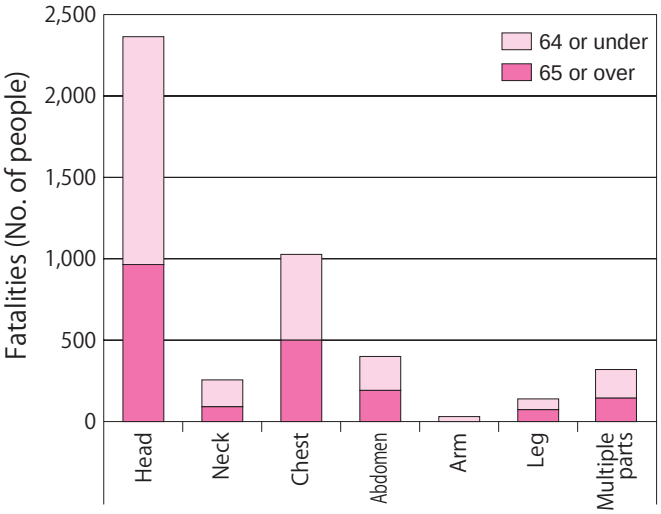


Fig.10 Class-1 moped fatalities by the body parts mainly injured and by age group (Cumulative total from 2003 to 2012)

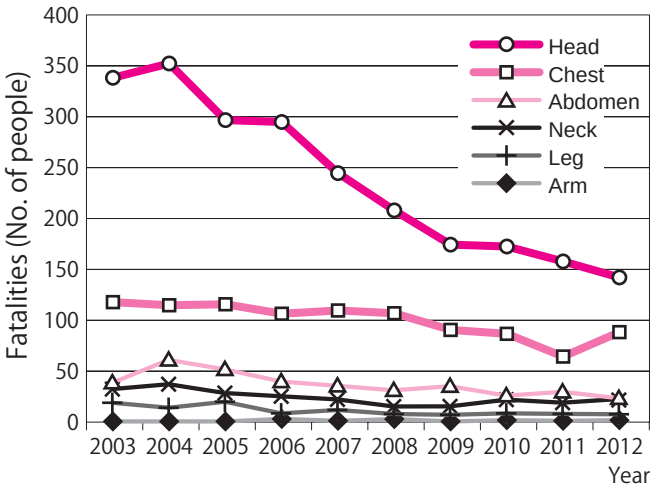


Fig.11 Trend in class-1 moped fatalities by the body parts mainly injured

Fig. 12 shows the trend in fatalities (all motorcycle occupants within 24 hours of the accident) resulting from head and chest injuries of riders aged 64 or under, whereas Fig. 13 shows the trend for riders aged 65 or over. Fatalities due to chest injuries do not show any decline even when considered in view of the age group of riders.
Fatalities due to chest injury in the age group of 65 or over in 2013 is close to that of head injuries. Hence it is imperative that both head and chest should be protected from sustaining injuries in order to reduce damages in class-1 moped accidents.
Fatalities due to head injuries is believed to have shown a decline by protecting the head during accidents owing to the establishment of wearing helmets; it seems in future chest protectors are also required to be worn in order to protect the chest from sustaining injuries.

Fig.12 Trend in class-1 moped fatalities due to head and chest injuring accidents in the age group 64 or under

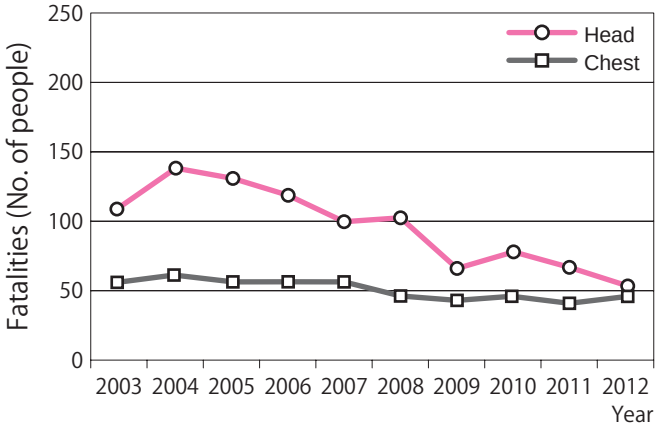


Fig.13 Trend in class-1 moped fatalities due to head and chest injuring accidents in the age group 65 or over

■Head and chest injuries are sustained during vehicle-to-vehicle crossing collisions

Let's study further about the head and chest injuring accidents which lead to fatalities more often.
Fig.14 shows the fatalities (cumulative total from 2003 to 2012 of all motorcycle occupants within 24 hours of the accidents) due to head and chest injuring accidents by the type of accidents. While Fig.15 shows analysis of the type of accidents in detail.
Apparently, fatalities due to head and chest injuries occur more during vehicle-to-vehicle collisions while the detail shows that crossing collisions accounts for more fatalities.

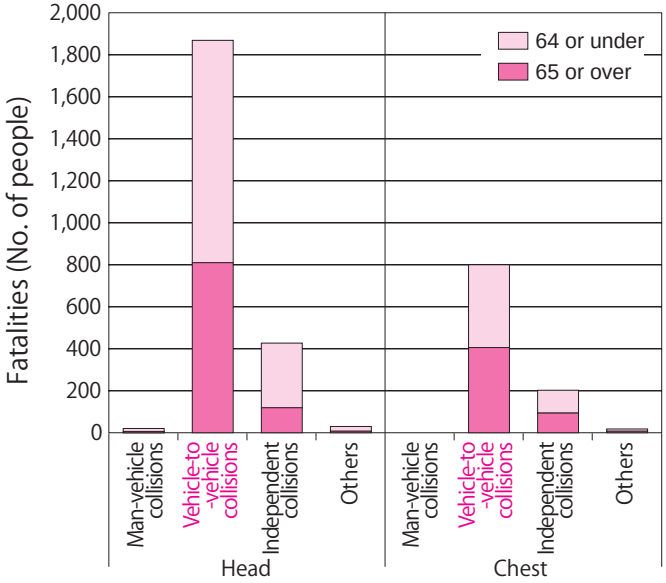


Fig.14 Class-1 moped fatalities due to head and chest injuring accidents by type of accident and by age (Cumulative total from 2003 to 2012)

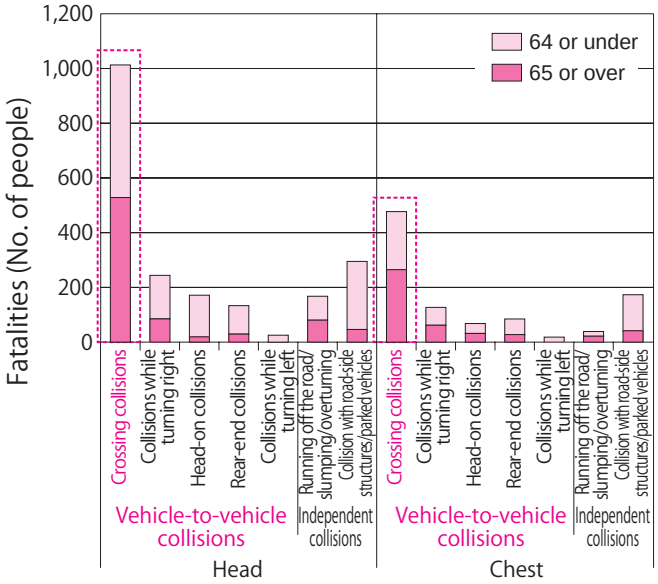


Fig.15 Class-1 moped fatalities due to head and chest injuring accidents by type of accidents in detail and by age

4 Key points to alleviate damages

■Effect of wearing helmets

Let's look at the effect of wearing helmets in alleviating the damages of an accident.
Fig.16 shows the fatality ratio (cumulative total from 2003 to 2012 of all motorcycle occupants within 24 hours of the accidents) while riding a class-1 moped with and without wearing the helmet. Fatality rate denotes the percentage of fatalities to casualties. The fatality rate when not wearing the helmet is roughly 7 times as that of wearing the helmet and it has not come off which indicates the importance of wearing helmets in alleviating the damages of an accident. In case of elderly riders aged 65 or over, the fatality rate is more when not wearing helmets or when wearing but has come off as compared to the age group 64 or under, which makes it all the more important to wear the helmet properly.

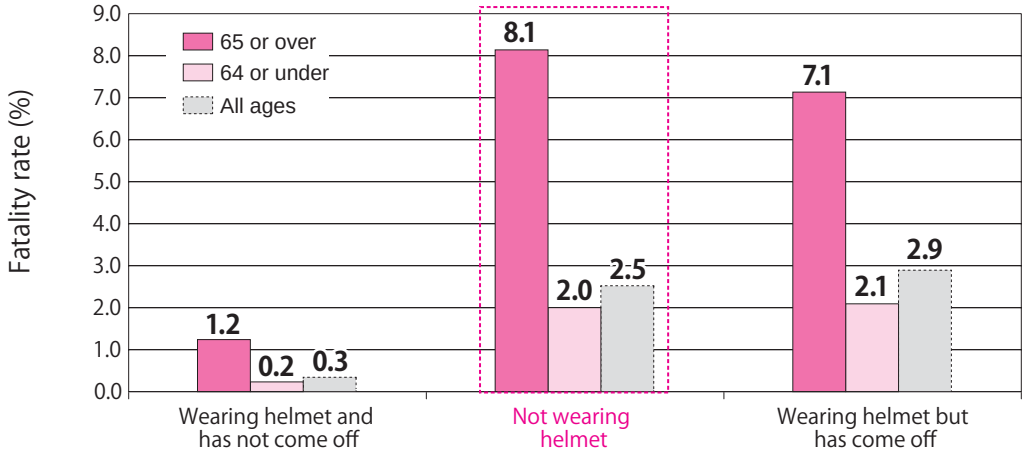


Fig.16 Fatality rate of class-1 moped riders when wearing or not wearing helmets by age group (Cumulative total from 2003 to 2012)
Fatality rate = Fatalities / Casualties x 100 (%)

■Effect of wearing chest protectors

Introduced below is the test conducted by Japan Automobile Research Institute (JARI) in order to speculate the effect of wearing chest protectors. (Excerpts from ITARDA Research Report[*3])

*3 Research Report of March 2011: "Research on chest protection of motorcycle riders conducted in Aug. 2010."

〔1. Speculate the effect of wearing a protector by way of chest impact test on a dummy〕

Fig.17 shows a dummy fitted with a chest protector. A pendulum-type impactor as shown in Fig.17-1 was employed for applying impact on the dummy's chest region and various data were measured with and without fitting the chest protector.

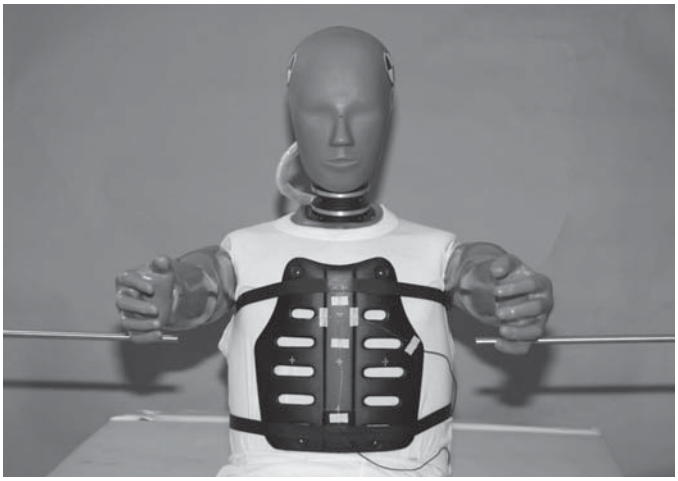


Fig.17 A dummy fitted with chest protector

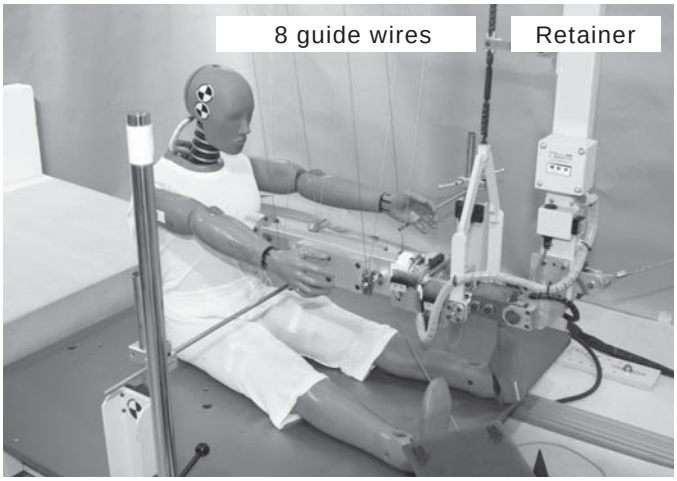


Fig.17-1 Image showing an impactor applying impact (Only impactor was used during the test)

Fig.17-2 shows the aspects of the impact test. While both flat-tipped and protruding impactors were employed to demonstrate the effect, wearing a chest protector proved useful in both the cases than not wearing, where the deformation of the dummy was more prominent. The alleviation of damage during impact can therefore be expected.

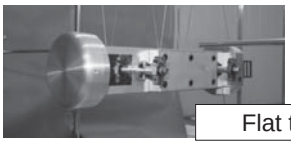
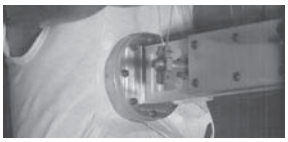
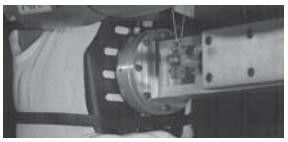
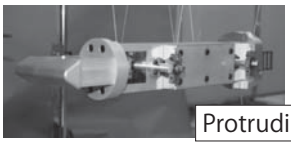
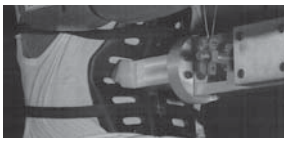
Impactor profile	Without protector	With protector
 Flat tip		
 Protruding tip		

Fig.17-2 Impact test

〔2. Example of commercially available chest protectors〕

Various kinds of chest protectors can be purchased at the motorcycle dealers or at the accessory shops. Choices like protectors integrated in jackets as well as protectors which can be worn directly as shown in Fig.18 are available.

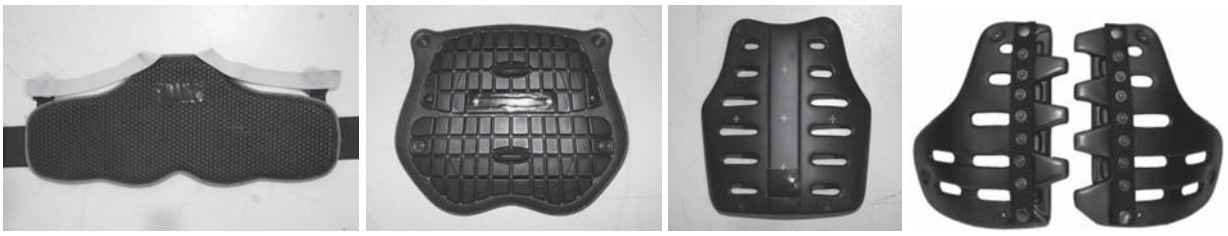


Fig.18 Example of commercially available chest protectors

〔3. Awareness activities for wearing chest protectors〕

＜Reproduced from the Metropolitan Police Department website＞
The Department is encouraging motorcycle riders to wear chest protectors for protecting their bodies from the impact of the accident in the following manner.

The watchword is
~Seat-belt for cars and protectors for motorcycles~

Examples of chest and abdomen protectors


Vest-type


Simple model (soft-type)


Simple model (for chest only)

Always secure fast the chin-strap of helmets and wear protectors

Even the white motorcycle police wear protectors

Source: http://www.keishicho.metro.tokyo.jp/kotu/roadplan/safety_riders.htm

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5 Conclusion

■Situation of class-1 moped accidents

(1) Overall fatalities of motorcycle riders show a declining trend, however, reduction in class-1 moped fatalities is not seen.

(2) Fatalities of young class-1 moped riders are on the decline while no reduction is seen in that of elderly riders.

(3) Fatalities are more at intersections when seen by the type of road configuration.

(4) Looking by the type of accidents, fatalities as a result of crossing collisions are more, whereas by the cause of accidents fatalities occur more often when the rider fails to confirm safety or stop temporarily for safety check.

(5) Deaths are more due to head and chest injuries in accidents when seen by the body parts mainly injured while the cause of such accidents are vehicle-to-vehicle crossing collisions.

(6) Although reduction in fatalities due to head injuries is observed, same is not the case with that of chest injuries. Wearing helmet together with chest protectors is necessary to protect the body from injuries.

■For reduction in accidents and alleviation of damages

(1) Key to prevent class-1 moped accidents

Let's avoid crossing collisions at intersections etc., by stopping the vehicle temporarily and confirming safety.

(2) Key to alleviate damages incurred by class-1 moped accidents

Needless to say wearing helmets properly plays a vital role in alleviating damages due to accidents. Moreover, wearing chest protectors and other safety gear is believed to be effective in alleviating the damages. Let's be proactive in wearing safety gears so as to alleviate the damages incurred in accidents and thus be prepared for the worst.

(Author: Kazunori Matsumura)

Notice

- Starting Monday 16 December, 2013 our headquarters have moved to the following address.

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- Please feel free to download the previous issues of ITARDA INFORMATION available at our Institute for Traffic Accident Research and Data Analyses website. Free downloads of other statistical databases and research reports are also provided for your reference.

当センターは、平成4年（1992年）に国家公安委員会、運輸省（当時）、建設省（当時）から設立許可を受けて、公益法人として設立されました。その後平成24年（2012年）4月に公益財団法人に移行しました。我が国で唯一道路交通法の定める「交通事故調査分析センター」の指定を国家公安委員会から受けた調査研究機関であり、交通事故の防止と被害の軽減のための交通事故の調査分析を行っています。

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