

# Thermoregulator Protective Clothing for Young Motorcyclist in Selangor

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## Abstract

Road accidents have become a worldwide issue every year. Malaysia has been ranked at 8th place as a country with high fatalities of road crashes in the Mortality from Road Crashes in 193 Countries Report. Specifically, in Malaysia, fatal accidents cases are mostly caused by motorcyclists in the age group between 16 to 25 years old. To prevent and reduce injuries, motorcyclists need to apply Personal Protective Equipment for safety while riding. Unfortunately, many motorcyclists do not wear PPE due to hot weather with most of them at a young age. The objective of this study is to identify suitable material use and to propose effective protective clothing, especially for young motorcyclists. The researcher applies qualitative research by conducting real case observation and surveys to gather the required data. The protective clothing for young motorcyclists was designed based on the collection of data from respondents. This study will help young motorcyclists to find suitable protective clothing for their safety to reduce the fatalities and injuries cases due to road accidents.

*Keywords* – Motorcyclist, Protective Clothing (PPE), Road Accident

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## 1. Introduction

Road accidents are a never ended issue all around the world. Every year, a statistic shows the number of cases that cause injuries and death. According to Solah, Hamzah and Jawi (2018), most of the death cases are due to road accidents involving vulnerable road users namely pedestrians, cyclists and motorcyclists. According to Abdullah, Kasim and Mansor (2018), by referring to the statistics of road accidents in Malaysia from 2010 to 2015, 490 000 cases were recorded which is the number that was increasing from a year before. From the numbers, motorcyclists are the highest individuals who have been involved in road accidents compared to drivers of other vehicles.

Most of the road accidents particularly among young drivers. Teenagers to young adults are the people who are really in the highest percentage in the motorcycle road accident Halbersberg (2019). Therefore, this research wants to study the reasons for the highest number of deaths among young motorcyclists because many researchers believe road accidents are affected by the attitudes of road users. One of the attitudes is not wearing protective clothing while on the road. Most of the researchers agree that protective clothing can protect the wearers and reduce the injuries on the body. This study will find out alternatives to open the eyes of young motorcyclists about the importance of protective clothing and attract them to likely use as for their safety.

## 2. Literature review

### 2.1 Road Traffic Accident as a Global Issue

According to the World Health Organization (2018) in the Global Status Report on Road Safety, approximately 1.35 million lives die due to road accidents every year. Nearly 3,700 people are dying on the world's road every day. Masuri, Md Isa and Mohd Tahir (2017) stated that Road Traffic Injury was predicted to climb up to the 8th top place of the leading cause of death in 2030. Besides that, according to Cioca and Ivascu (2017), accident reduction and road safeties are the major concern and public health as over 3000 people from over the world deceased daily because of road traffic.

### 2.2 Road Traffic in Malaysia

In Southeast Asia, Malaysia has the second largest fatality rate due to road crashes after Thailand (Rusli, Oviedo-Trespalacios and Salam, 2020). A serious attention is needed as road accidents are one of the top five causes of death in Malaysia according to the Institute for Health Metrics and Evaluation (Ting, Tan and Hashim, 2020).

#### 2.2.1 Statistic of Road Accident by Vehicles Types

According to Mahat, Jamil and Raseli (2020), the Royal Malaysian Police reported a national statistics that shows a very significant proportion of fatal accidents which are caused by motorcyclists.

A study by Idris, Hamid and Hua (2019), a report by Road Transport Department, Malaysia (2017) stated that the fatality cases involving motorcyclist and pillion from 2008 until September 2017 has the highest percentage which is 61.2% compared to other category followed by car that has 20.3 %. The lowest fatality cases involve buses.

#### 2.2.2 Statistic of Road Accident by States in Malaysia

A statistic by the Department of Statistic Malaysia (2019) in Social Statistics Bulletin 2019, Selangor recorded the highest number of deaths in road accidents with 1,046 cases. Kamarudin, Abd Wahab, and Umar (2018) also stated that Selangor is one of the states in Malaysia that has the highest rate of death due to road accidents.

#### 2.2.3 Statistic of Road Accident by Age

According to Abdullah, Mohamed Kassim and Mansor (2018) and Free Malaysia Today (2016), the Royal Malaysian Police (RMP) said that in 2015 there were 3,816 deaths involving motorcyclists. The highest number of deaths in motorcycles with 934 cases were individuals aged between 16-20 years old, followed by age between 21-25 years old (828) and age group between 26-30 years old (641).

### 2.3 Personal Protective Clothing

As motor vehicle crashes are the main cause of injuries related to death, many researchers did a study on the protection for motorcyclists. To minimize the risk of injuries and death in motorcycle accidents, the best way is by wearing personal protective equipment (PPE) (Solah, Hamzah and Jawi, 2019). According to de Rome (2019), even though there is strong evidence that motorcycle personal protective clothing (PPE) reduces the risk and severity of injury in crashes, many motorcyclists still ride unprotected. Thermal discomfort is the reason for the motorcyclists being three times less likely to ride unprotected due to hot weather and most of them in the younger age group (de Rome, 2019 and Solah, Hamzah and Jawi, 2019).

### 2.4 Thermoregulation

Thermoregulation means a mechanism occurs towards the mammals to maintain body temperature by tightly controlled self-regulation at any level of surrounding temperature. Temperature regulation is a type of homeostasis which is a process that has been used by biological systems to preserve a stable internal state to

survive (Osilla, Marsidi and Sharma, 2020).

## 2.5 Textile Technology

According to Ferreira and Carvalho (2019), textile technology extends throughout different fields of activities like engineering, medicine and design. The textile surface changes its characteristics after one or more functionalizations are applied onto the fabric.

The term breathability is characterized into breathable and waterproof. In order to engineer breathability fabric or garment, both characters need to be considered to design into fabric or garment. They are several categories have to be encountered into breathability (Hunter and Fan, 2009):

- i. Closely woven fabric
- ii. Micro-porous membrane
- iii. Hydrophilic membranes and coating
- iv. Combination of micro-porous membrane and hydrophilic membranes and coating
- v. Smart breathable fabric / Phase Change Material (PCM)
- vi. Fabrics based on bio-mimetic

## 3. Methodology

This study aims to identify the reasons for unprotected young motorcyclists not wearing protective clothing for road safety and also to study the suitable material and effective design to make protective clothing as expected from young motorcyclists for daily utility. The researcher implements the qualitative method which practices several methodology tools which are real case observation, survey and experimentation to collect data required.

Real case observation was carried out in the Shah Alam region to study the behavioural of young motorcyclists while riding motorcycles on the road. The reason for the observation is to identify the use and type of protective clothing among young motorcyclists while riding motorcycles. The observation found that most young motorcyclists do not wear proper protective clothing as a road safety measure. Besides that, the researcher carried out an observation to study the existing protective clothing related in terms of material used, technical and protection wise.

The attributes from the observation were used in designing and developing questionnaires for young motorcyclists group age between 16-20 years old, 21-25 years old and 26-30 years old in Selangor state. The questionnaire was developed via Google form survey which consists of 25 questions in three sections: Section A (Demographic Profile), Section B (The Awareness and Understanding), Section C (Opinion and Recommendation). Section A contains general information such as gender, age, employment status, license type. As for Section B, the questions correspond to road accidents and protective clothing. Section C queries about respondent's protective preference in terms of material, colour, protection and design. The researcher distributed the questionnaire by using a simple random sampling technique in social media platforms such as WhatsApp, Facebook, Instagram and Twitter. The sample size for this study is n=254 respondents.

Experimentation was conducted on materials suggested by researchers to study the characteristics which are suitable for motorcycle protective clothing as body protection and weather protection as an expectation from young motorcyclists.

#### 4. Project outcomes

The researcher found out that there are important features of protective clothing that have been highlighted by the respondents in a research survey. Figure 1.0 below shows two features that make young motorcyclists not likely to wear protective clothing as a road safety. Authors should consider the following points:

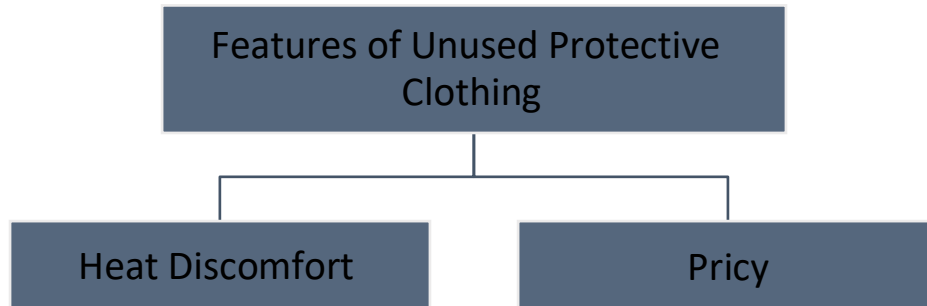


Figure 1.0: Features of Unused Protective Clothing

Figure 2.0 represents the three preference features of Thermoregulator Protective Clothing for young motorcyclists as expected by respondents through a survey.

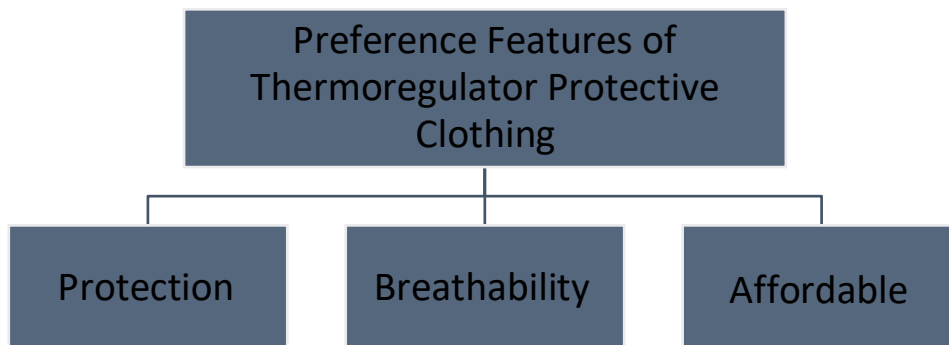


Figure 2.0: Preference Features of Thermoregulator Protective Clothing

#### 5. Conclusion

This study aims to identify the problem of existing protective clothing and also the reasons for unprotected riders due to high cases of road accidents among young age motorcyclists. Besides, it is also to study the suitable material and propose the design for protective clothing especially for the young age group among motorcyclists in Selangor. The smart clothing of motorcycle protective clothing with effective features will help the young age group to find suitable protective clothing while riding especially in hot weather. Thus, it helps to reduce the number of fatalities and injuries due to motorcycle road accidents in Selangor state.

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