

## **Ergonomic Study of Bicycle Handle-A Review**

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### **Abstract**

The goal of this research is to increase safety, comfort & performance of bicycleriders. This research is basically carried out for male & female bicycleriders. In this study of ergonomical aspects & theories of human factors are considered or the comfortability as well as suitability of bicycle handle to male & female riders. Knowledge of human abilities, limitations & physiological conditions are also taken in to consideration.

This paper provides design requirements for bicycle handles & also Provides some statistical data regarding the comfortably & suitability of a particularly designed bicycle handle to both male & female riders. The environmental factors may also affects on the comfort ability of bicycle riders including male & female.

Particularly to encountered the problem related to the design of bicycle handle the several techniques arc included such as literature studies, field studies, conduction of survey, experiments & by taking anthropometric Dimensions of male & female bicycle riders.

To investigate the problem related to handle bar design of a bicycle and ergonomist must be able to identify, organize and analyse a variety of problems and suggest appropriate design solution. The existing situation must therefore first be analysed, design solution must be generated and then these ergonomic design solution related to handle bar must be assessed for its flexibility & comfortability for the same.

## **Introduction**

This century is called as a century of modern machines and fast moving automobile vehicles, but the bicycle has its own identity and importance. It is also known as a bike of rural people. Apart from the fact that it is eco-friendly & economical. It also helps the rider to keep fit and healthy.

This paper discusses the ergonomic improvements that can be incorporated in the design of a bicycle handle bar by ergonomical study.

An effort has been made to understand the muscular problems & other difficulties faced by the male & female riders while riding the traditional bicycle.

In today's scenario, various types of bicycles are available in the market. Lot of changes has been implemented in design of bicycle handle bar irrespective of an ergonomic view. It is just for good aesthetic views or attractive look of the bicycle. Our aim is to redesign the bicycle handle bar of conventional bicycle which will be suitable for the riders of a different height & irrespective of male & remote category.

## **Problem Statement**

It is observed & experienced that when male riders ride a bicycle his riding posture may differ from the bicycle riding of a female rider.

After verifying [he data collected the common ergonomic issues are discussed below.

- The positioning of the handle is not at the optimum level for all riders
- Because of the non adjustable design of existing handle bar.
- To improve the efficiency & comfort level of bicycle riders.

## Objectives of the Study

- To determine the anthropometric dimensions of male & female bicycle riders related to handle bar design.
- To study & identify ergonomic risk factor in bicycle handle bar.
- To identify discomfort level related to handle bar.
- To enlist handle design parameters.
- To design adjustable bicycle handle
- Fabrication of ergonomically designed handle bar.
- Comparison between existing handle & ergonomically designed handle bar using suitable qualitative or subjective techniques.

## Scope of Study

In this project a few adult male and female bicycle riders are selected to questionnaire survey and personal interview session obtained.

Bicycle riders worksheet assessment risk suggested to identify the riders posture to observe the ergonomic risk factors from the discussion with male and female riders and the observation at the time of bicycle riding on the road.

The main aim or objectives of the project is to improve the performance, conformability & suitability and to improve the bicycle riding posture for male and female riders.

Further objectives of the study are to evaluate various factors which are responsible for comfort and suitability big the traditional handle bar design. Such as skeleton structure of male and female riders. The project attention on effectiveness of ergonomic intervention in bicycle handle bar design by means of suggested recommendation and methodology adopted for the design of handle bar and to find out the riding posture for male and female also. In case of bicycle handle bar, the comfortability of male and female bicycle riders depend upon many sensitive parameters.

- Operational practices.
- Bicycle size.
- Handle bar size.
- Distance between seat & handle bar.

### **Ergonomic intervention-**

By using survey method and other ergonomic techniques, improve the performance of the bicycle rider's by providing proper material, all controls related with bicycle handle bar and providing adjustable handle bar to minimise the injury and so as to design the ergonomically correct bicycle handle bar.

For designing the ergonomically correct bicycle posture, the ergonomic survey method is used. By designing the questionnaire on the basis of problems or difficulties faced with today's conventional handle bar. After identifying the problems with present handle bar, the new handle bar which is suitable to all average riders including male and female riders by applying ergonomic design principles.

Finally the comparative study is carried out between simple handle bar and ergonomically designed handle bar.

Before designing the handle bar ergonomically, Anthropometric dimensions of male and female riders related with handle bar are taken with the help of different instruments and special instruments developed for measuring wrist and twist bent angle etc.

Following parameters are considered while designing the handle bar ergonomically.

1. Elbow angle.
2. Shoulder flexion

3. Horizontal distance between elbow to elbow.
4. Wrist twist.
5. Wrist flexion
6. Forearm length
7. Arm length etc.
8. Neck flexion.
9. Bent angle.

After conducting the trial on conventional bicycle handle bar & collecting  
The data from the same & finding the correct seating posture of the bicycle rider.

### **Design goals**

The design goals of handle bar depending upon use of the bicycle and it is common for all bicycles:

- Providing the necessary leverage to steer the bicycle.
- Proper positioning of the rider's hands according to the purpose and style of the bicycle.
- Providing a mounting platform for brake and gear as well as various accessories.

Racing/touring and triathlon bars have additional goals:

- Enabling the rider's to assume an aerodynamic position.
- Enabling the rider's to change hand and body position during long rides, preventing fatigue.
- Enabling aerodynamic routing of brake cables.

Mountain bikes handle bar design goals have less focus on aerodynamic, more negotiating terrain:

- Providing enough control to bicycle riders over obstacles.

- Being strong enough to withstand the extra forces generated in some activities/crashes
- Optionally: not significantly increasing vehicle weight

BMX and dirt-jump bikes bars have similar needs to mountain bikes, with the added incentive of allowing even finer control, such as specific handling during the time the bike is airborne or during certain man oeuvres.

## Conclusion

In this study of ergonomical aspects & theories of human factors are considered for the comfortability as well as suitability of bicycle's handle. Knowledge of human abilities, limitations & physiological conditions are also taken in to consideration.

This paper provides some statistical data regarding the comfortability & suitability of a particularly designed bicycle handle to both male & female riders. The environmental factors may also affect on the comfort ability of bicycle riders which is discussed in this paper

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