

CHAPTER I

INTRODUCTION

1.1 BACKGROUND

Myopia is an ocular disorder that also epidemic and very common to occur around the world. (Cooper and Tkatchenko, 2018) Unfortunately, the mechanism of how myopia occurred is still confusing. The researchers believe how myopia occurred still in uncertainty, it appears that both genetic and environment plays a role in the occurrence of myopia. (Cooper and Tkatchenko, 2018). As myopia causes global issues, it can be seen in an early age that showed in the year 2000 the occurrence of myopia is 22,9% and will increase up to 49,7% in the year of 2050. The high myopia that is predicted in the 2050 will reach up to 9,8% from the early number 2,7% in 2000. (Wu *et al.*, 2018) as the number increases rapidly, we as the medical students need to think about how to slow it and degrade the number of myopia incidence. In Indonesia, prevalence of refractive error takes place in the first place and reach 25 percent from total population. (Wulandari and Mahadini, 2018) Myopia is a serious condition due to people mostly neglecting it and underestimating it just because it can simply be corrected or handled by using contact lenses, spectacles and refractive surgery. (Wu *et al.*, 2018)

As for a better understanding about myopia, the purpose to study about the eye and its mechanism of how myopia occur is needed. But it can be done only in a unliving ocular tissues. Animal model research can be done in the several animals such as chicks, guinea pig, rabbit, rhesus monkeys, mouse, marmoset, etc. some of these animals can be studied due to the similarities of the mechanism of myopia and its

pathogenesis like in human, similar in the structure of the eye, accommodative response is also present. The most common methods to developing myopia in animal model are form deprivation myopia (FDM) using occlusion and lens induced myopia (LIM) by applying the lens. (Wang *et al.*, 2021)

Many experimental research conducted previously in animal model help the medicine world to always improve knowledge especially about myopia. Even though experimental myopia in animal model only done in the laboratory, but the impact for human knowledge is many because the anatomical similarities from the animal eye and human eye. Previously, many experimental myopia research in animal model (Xiao *et al.*, 2014). In 1977 the experimental myopia conducted in monkey in the age of 2 weeks (Wiesel and Raviola, 1977) The result of both FDM and LIM after the period of experiment shows the elongation of the eye, error refraction status, and sclera that grow abnormally (Xiao *et al.*, 2014)

The purpose of this research is needed due to the prevention way of the occurrence of myopia in the world, especially in Indonesia. The method of Form Deprivation Myopia (FDM) in the animal model that conducted in Indonesia is rarely done. Dominantly, research of experimental myopia in animal always use mice (Mori *et al.*, 2020) , chick (Goodyear *et al.*, 2008; Carr and Stell, 2016), and guinea pig (Xiao *et al.*, 2014; Howlett and McFadden, 2006). Rabbit is also used for experimental myopia (Nie *et al.*, 2012; Kusumawardhany *et al.*, 2019). By the conclusion, the experiment of FDM using rabbit (*Oryctolagus cuniculus*) as the animal model is profitable due to anatomical similarities as human's eye structure (Lin *et al.*, 2018).

With the experimental research from the rabbit's eye that performed deprivation will be gained the axial length of the eye and the refraction status. These two parameters are important as the indication of myopia progression that will be shown with the axial length elongation and the changes of the refraction status (Xiao *et al.*, 2014) . These data will highly beneficial for the next research in animal model especially when using (rabbit) *Oryctolagus cuniculus*.

Hopefully, after this research done, it become one of the alternative for the next research to use the data for further myopia experiment using animal model. Indonesian people to prevent the progression of myopia in the future. This kinds of research able to seek new alternative on how to prevent myopia. Unfortunately, this type of animal research are rarely done in Indonesia, so after this research conducted, we want to provide more data that will be develop for the next research and the new idea to prevent the myopia progression in the world.

1.2 Research Question

Based on the background that already written above. This research's question are :

1. Is there any effect in the axial length after the form deprivation myopia in the *Oryctolagus cuniculus* as animal model?
2. Is there any effect in the refraction status after the form deprivation myopia in the *Oryctolagus cuniculus* as animal model?

1.3 Research Goal

1.3.1 General Research Goal

To discover and observe the effect of form deprivation myopia (FDM) in the animal model that will be shown in the axial length and the refraction status of the eye.

1.3.2 Specific Research Goal

1. To observe and discover the effect of form deprivation myopia (FDM) in axial length elongation from the animal model.
2. To observe and discover the effect of form deprivation myopia (FDM) in the changes of the refraction status from the animal model.

1.4 Research Benefits

1.4.1 Theoretical Benefits

The theoretical benefits that will be gain from this research is knowing the effect of the form deprivation myopia (FDM) that will be conduct in animal model, so that it can be used for further development of the science to help slowing the epidemic of myopia in the future, especially Indonesia. Also, giving the scientific information about the axial length and refraction status changes in animal model with form deprivation myopia (FDM).

1.4.2 Practical Benefits

The practical benefits that will be obtain from this research are as a reference for another research that will be conduct in the future about axial length and refraction status changes in animal model with the form deprivation myopia (FDM), give the data information about the changes due to the form deprivation myopia in the *Oryctolagus cuniculus* as the animal model in the particular time. Show the final data of the axial length elongation and refraction status changes after the deprivation in *Oryctolagus cuniculus* that will useful for the further research.

