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Factors Affecting of Myopia: A Literatur Review

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ABSTRACT
Myopia as refractive error will be the most common cause of visual impairment over the world until half of the world's populations are suffer from myopia in 2020. All of age groups can get it, from adolescents and even adults
To determine the risk factors that increase the incidence of myopia.
Extensive review of the recent literature was conducted in electronic databases Pubmed, Science Direct, Wiley Online using the appropriate key words "Myopia", "Increase Factors" dan "Effecting Factors". The results of the search for articles after being screened through inclusion criteria and exclusion criteria were found as many as 7 research articles.
Myopia can be caused by several factors such as heredity, environmental factors, and habitual factors such as work and outdoor activities, intensity of gadget use and sleep time.

Keywords: Myopia, Risk Factors, Prevalence Of Myopia

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BACKGROUND

Myopia (nearsightedness) is the most common refractive vision disorder in children. It is characterized by blurring of objects viewed from a distance, and is generally the result of abnormally extended eyeball - which causes the refractive image formed by the cornea and lens to fall in front of the retinal photoreceptors.(1).

Myopia occurs in more than 50% of the population in many industrialized countries and is expected to increase. The prevalence of myopia in the United States has increased from 25% to 44% between 1972 and 2004. In urban communities in Asia, the prevalence is more than 80%.(3) In 2015 it was reported in Nature that the prevalence of myopia in major Southeast Asian cities has increased from about 20% in the years following World War II to current levels of over 80%. In the same year, the European Eye Epidemiology (E3) consortium published prevalence figures which showed a clear increase in Europe as well: 15% in those aged 75, 34% in those aged 50, and 46% in those aged 25. year.(2)

Myopia is estimated to affect nearly five billion people worldwide in 202 0 and is a global public health problem with significant social, educational, and economic consequences. The emergence of myopia jugabergeser to age younger, who became perhatiankarena children smaller showing more cepatperkembangan myopia and more likely to achieve a higher degree of myopia. This can substantially increase the risk of developing vision-threatening conditions including myopia maculopathy, glaucoma, cataracts and retinal detachment later in life.(9)

METHODS

The search was carried out with the PICOT technique. Articles were searched using the *Pubmed, Science direct and Wiley's online databases* . Search in the database using the keywords *"Myopia", "Increase Factors" and "Effecting Factors"*. To clarify the search and make it easier to determine the article, the author searches using *keywords* and *Boolean operators (AND, Or , and NOT)*. The results of the search for articles after being screened through inclusion criteria and exclusion criteria were found as many as 7 research articles. Search with database *Pubmed, Science direct and Wiley online* using keyword 1, namely *" Myopia " (Tittle / Abstract) AND "Factors " (Tittle / Abstract) AND "Increase" (Tittle / Abstract)* found 205 articles. A search with Wiley's online database using keyword 2, namely *"Myopia" AND "Affecting factors "* and through screaning found 11,669 articles. If a search using the Pubmed database using keywords 1 and 2, there are 230 research articles. If a search using the Science Direct database uses keywords 1 and 2, there are 4377 research articles. If a search with the Wiley Online database using keywords 1 and 2 found 15,336 research articles. So from the search results using the Pubmed, Science Direct, and Wiley Online databases after screening, 967 research articles were found. After screening full text, qualifying, double publication with the following inclusion and exclusion criteria:

The inclusion criteria are: research with accredited journals, has gone through clinical tests, *medical science, full text* , publications in 2017-2021, while the exclusion criteria are: English-language articles, *reviews, review articles.*

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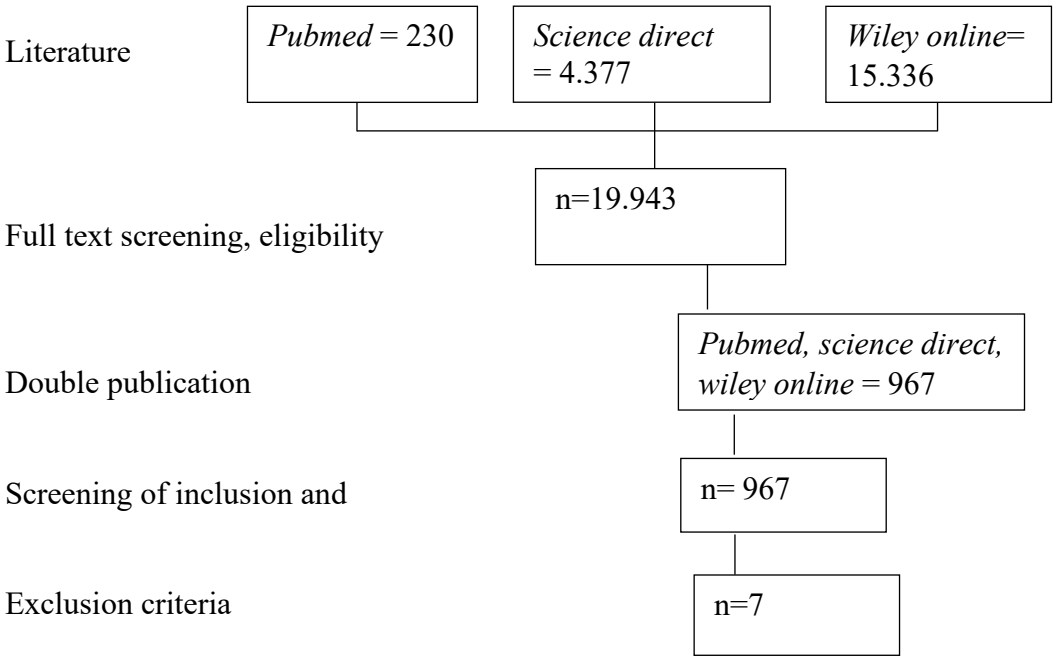

Figure 1. Summary of evidence search and selection criteria

RESULT

Based on the results of the literature search, there were 7 research results that matched inclusion and exclusion.

Myopia

Myopia, one of the most common eye diseases, has become a global public health problem worldwide.[6] Nearsightedness (myopia) is the most common visual disorder among young people. Eyeball that is too long (Number) causes the focal point to fall in front of the retina. As a result, objects that are far away appear unclear, while objects that are nearby appear sharp. Myopia is treated using eyeglass or sunken contact lenses and in certain cases can be corrected with surgery.[2]

Factors Affecting Myopia

A person with little exposure to the sun has a fivefold risk of developing myopia, which can increase to 16 times if the person also does *close-up work*.[2] Time spent outdoors is not only a risk factor involved in increasing myopia, but it can also be a risk factor for controlling myopia progression with the treatment of *MiSight CLs*.[10] Although genetic factors play a role in the development of myopia, the rapid growth in prevalence is most likely due to environmental and lifestyle factors, such as studying, reading, and etc.[4]

Author	Method	Instrument	Result
Joseph et al, (2018) [5]	Interview	structured questionnaire, eagent strip test and reflectance meter	The age-standardised prevalences of myopia, hyperopia and astigmatismwere 35.6% (95% CI: 34.7–36.6), 17.0% (95% CI: 16.3–17.8) and 32.6 (29.3–36.1), respectively. Of those with myopia (n = 1490), 70% had advanced cataract.Of these, 79% had presenting visual acuity (VA) less than 6/18 and after best correction,44% of these improved to 6/12 or better and 27% remained with VA lessthan 6/18. In multivariable analyses (excluding patients with

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			advanced cataract),increasing nuclear opacity score, current tobacco use, and increasing height wereassociated with higher odds of myopia. Higher levels of education were associatedwith increased odds of myopia in younger people and decreased odds in olderpeople. Increasing time outdoors was associated with myopia only in older people.Increasing age and female gender were associated with hyperopia, and nuclearopacity score, increasing time outdoors, rural residence and current tobacco usewith lower odds of hyperopia. After controlling for myopia, factors associatedwith higher odds of astigmatism were age, rural residence, and increasing nuclearopacity score and increasing education with lower odds.
Parssinendan Kauppinen, (2019)[7]	Eksperimental, Subjective refraction, using the fogging method, was performed at baseline and at the three annual follow-ups	a questionnaire at the clinical follow-ups.	Mean spherical equivalent (SE) at baseline was _1.43 (_0.60) D, rangingfrom -0.38Dto_3.00 D. At follow-up end, mean SE of the more myopic eye was_5.29(_1.95) D, ranging from _1.00 D to _11.25 D. High myopia prevalence with thedefinitions SE < _6.00 Din the right eye and SE ≤ _6.00D or ≤_5.00 Din either eyewas 24%, 32% and 52%, respectively. In this study, high myopia was defined asspherical equivalent (SE) ≤ _6.00Din either eye. If both parents were myopic, the oddsratio (OR) of having high myopia was 3.9 (95% CI: 1.5–10.4). Younger age at baselinepredicted higher prevalence of high myopia; baseline ages between 8.8 and 9.7 andbetween 11.9 and 12.8 years gave prevalences65%and 7%. Higher myopia at baseline,higher myopic progression between the first follow-ups and more time spent on readingand close work as compared with time spent outdoors were associated with high myopia.
Alvarez - Peregrinaet al. (2019)[8]	A cross-sectional study to estimate myopia prevalence in a sample of children in Spain has been carried out.	In addition, a questionnaire regarding their lifestyle, family history, and geographical data was carried out	The prevalence of myopia in the sample of children studiedhas increased from 17% in 2016 to 20% in 2017. Likewise, the number of children with high myopia has also increased, from 1.7%in 2016 to 3.6% in 2017. 43.3% of the participants spent more than 3 hours a day doing near activities, and 48.9% of this groupspent more than 50% of this time using electronic devices. In addition, only 9.7% spent more than 2.5 hours outdoors each day.Conclusion. Myopia prevalence appears to be increasing in Spain. Lifestyle factors appear to be increasing the risk of myopia.
Prieto-Garrindo et al,(2020)[11]	This study is part of the MiSight® Assessment Study Spain (MASS), statistical analysis using bivariate	A questionnaire designed	The first year of treatment, twenty (49%) children wereclassified as responders (axial length increase less than0.11 mm) and twenty-one (51%) as non-responders (axiallength increase greater than or equal to 0.11 mm). And thesecond year sixteen children (39 %) were responders andtwenty- five

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	analysis, A Chi square Automatic Interaction Detection (CHIAD) analysis, BM SPSS Statistics for Windows, Version 22 were used for decision tree and logistic regression analyses respectively		children (61 %) non responders.A post hoc analysis of the sample size of this pilot studyshowed that taking a statistical power of 0.90 and assuminga standard deviation of the change in axial length over a 2-year period of 0.10 mm, a sample size of 8 subjects per groupwas needed to detect a difference in axial length variationequal to 0.22 mm at P = 0.05.
Lanca dan Saw, (2020)[12]	A cross-sectional or cohort with different outcomes. RevMan v. 5.3 software was used for the statistical analysis.	Screen time for near was assessed by questionnaires completed by parents, children or both	Fifteen studies were included (nine cross-sectional and six cohort studies) with a total of 49 789 children aged between 3 and 19 years old. Seven studies found an association between screen time and myopia. The results showed mixed evidence with the more recent studies exposing a trend of association between hours spent by children using screens and myopia. Meta-analysis using a random-effects model was performed in five studies (n = 20 889) that reported odds ratio (OR). The I 2 statistics was used to assess heterogeneity. A pooled OR of 1.02 (95% CI: 0.96–1.08; p = 0.48) suggests that screen time is not associated with prevalent and incident myopia in this group of five studies. Summary: The results for screen time and myopia are mixed. Further studies with objective screen time measurements are necessary to assess evidence of an association between screen time and myopia
Liu et al., (2020)[13]	A school-based prospective trial were randomly assigned to three groups. All analyses were performed using Stata/IC 15.1	A questionnaire	Our results suggest that 'sleeping late' is a risk factor for myopia prevalence at baseline (odds ratio [OR]= 1.55, p = 0.04), 2-year myopia incidence (odds ratio [OR]= 1.44, p = 0.02) and progression over 24 months (p = 0.005), after adjusting for residency area, age, gender, sleep duration, and time spent outdoors. The identifcation and consistency of results with late sleepers being a susceptible group to both myopia onset and progression suggests a complex relationship between circadian rhythm, indoor environment, habitual indoor activities and myopia development and progression.
Hagen et al, (2018)[14]	A cross-sectional study with all statistical analyses were performed using R statistical sofware, version 3.4.0 including the packages MASS and gmodels	Verbal and written information by questionnaire	this cross-sectional study of adolescents in Southeast Norway revealed hyperopia to be the most common refractive error, with the prevalence of myopia being quite low, despite the few daylight hours in the autumn-winter period and high levels of indoor activity and near work. While the origin of refractive errors is likely multifactorial56, a dose-response relationship between daylight (outdoor exposure) and ocular axial elongation alone cannot

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explain the low prevalence in myopia, anisometropia and astigmatism in this population. Genetic and environmental risk factors may impact how refractive errors develop diferently81, and our results may point to a lower genetic predisposition to myopia in this population. Alternatively, perhaps there is a particular combination of genetic predisposition, circannual adaptation, timing and pattern of exposure to myopia-generating environmental triggers that are efective in protecting the population at this latitude against myopia.

DISCUSSION

Myopia is a disturbance of vision refractive Palin g common in children and the age of adolescence [(1)]. Myopia can occur as part of a systemic congenital syndrome that involves several body tissues, which is called syndromic myopia. However, the majority of myopia falls outside this category and is usually classified according to age of onset, i.e. congenital (present in infancy, often at high rates, especially in premature infants), preschool, adolescent-onset or school (the most common form) , and adult onset [(16)]. An etiology of myopia is multifactorial, involving interactions between environmental factors and genetic behavior, with decreased time outdoors, urbanization, disturbed / delayed sleep, increased time spent on education and time spent reading continuously or in long periods of time at work. near all followed p as a possible effect [(9)]. This cross-sectional study of adolescents in Southeast Norway revealed hyperopia to be the most common refractive error, with a fairly low prevalence of myopia, despite several hours of daylight in the autumn-winter period and high activity indoors and near places. work. While the origin of the refractive error is likely to be multifactorial 56, the dose-response relationship between daylight (outdoor exposure) and axial elongation of the eye alone cannot explain the low prevalence of myopia, anisometropia and astigmatism in this population. Genetic and environmental risk factors can influence how refractive errors develop differently 81 and our results may indicate a lower genetic predisposition for myopia in this population. Alternatively, there may be certain combinations of genetic predisposition, circulatory adaptations, timing and patterns of exposure to environmental triggers that produce myopia that is effective in protecting populations at these latitudes against myopia [(14)]. Discussion Results The age standard prevalence of myopia, hyperopia and astigmatism was 35.6% (95% CI: 34.7-36.6), 17.0% (95% CI: 16.3-17.8), respectively. and 32.6 (29.3-36.1). Of those with myopia (n = 1490), 70% had advanced cataracts, 79% showed less than 6/18 visual acuity (VA) and after best correction, 44% improved to 6/12 or better and 27% remained with VA less than 6/18. In a multivariable analysis (excluding patients with advanced cataracts), increased nuclear opacity score, current tobacco use, and increased height were associated with a higher likelihood of myopia. Higher levels of education were associated with an increased likelihood of myopia in the age factor exhibited in younger people and a decreased probability in older people. Increased time outdoors was associated with myopia only in the elderly. Increases in female age and sex were associated with hyperopia, and nucliropacity scores, increased time outdoors, rural living and current tobacco use with lower likelihood of hyperopia. After controlling for myopia, the factors associated with a higher likelihood of astigmatism were age, rural residence, and increased nuclear capacity scores and a lower chance of increased education [(5)].

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Our results showed that 'sleeping late' was a risk factor for the prevalence of myopia at baseline (odds ratio [OR] = 1.55 , p = 0.04), incidence of myopia over 2 years (odds ratio [OR] = 1.44, p = 0.02) and progression for 24 months (p = 0.005), after adjusting for area of residence, age , gender, sleep duration and time spent outdoors. The identification and consistency of results with sleep-late people being the group prone to the onset and development of myopia demonstrates a complex relationship between circadian rhythms, indoor environment, usual indoor activity, and development and development of myopia [(13)].

The results of this study indicate that the factors affecting the occurrence of myopia are heredity and environmental factors. A child who has one parent suffering from myopia will have a two times higher risk, whereas if both parents suffer from myopia, the risk of eight times higher than children with parents who do not suffer from myopia. Environmental factors such as outdoor activities, close work, and education will affect myopia. Research in Singapore has shown that people who spend more time outside are less likely to have myopia. Time to work at close range and lack of outdoor activity are environmental factors that are of much concern [(5).] The results of the study by Liu et al., (2020) showed that sleeping late (late sleeping time) was associated with a higher likelihood of becoming myopic. Modeling measures show that staying up late is a better predictor of waking up late. Even after accounting for sleep duration and weekly outdoor time, those who slept at 9:30 p.m. or later were 1.55 times more likely to be nearsighted at baseline than those who slept before 9 p.m [(13)].

CONCLUSION

Myopia is one of the most common refractive vision disorders in children and adolescents [(1)]. Myopia can occur as part of a systemic congenital syndrome that involves several body tissues, which is called syndromic myopia. Of the 16 journals were taken and used as materials for writing and only 7 journals in review (literature) it was concluded that the factors that affect m iopia may be caused due to hereditary factors, environmental factors, factors of age , gender factor and factor habits, for example work and *outdoor activities* , intensity of gadget use and sleep time.

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