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Hubungan antara Pendidikan, Seks, dan Usia dengan Kelainan Refraksi di RSU DR. Wahidin Soedirohusodo

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Abstrak

Prevalensi kelainan refraksi dan hubungannya dengan pendidikan, usia dan jenis kelamin di RSUD DR. Wahidin Soedirohusodo belum dinilai secara komprehensif. Penelitian ini bertujuan untuk mempelajari distribusi dan faktor risiko kelainan refraksi di RSU DR. Wahidin Soedirohusodo. Metode penelitian ini berupa cross-sectional berdasarkan populasi. Responden diwawancarai dan menjalani pemeriksaan mata klinis standar. Kesalahan refraksi ditentukan oleh perangkat refraksi otomatis. Kelainan refraksi adalah miopia, hiperopia, dan astigmatisme. Miopia dan hiperopia apabila masing-masing sebesar -0,5 / + 0,5 dioptri (D) atau lebih; astigmatisme apabila > 0,5 Dioptri. Hasil penelitian menunjukkan bahwa total 1.760 pasien dengan kelainan refraksi dari Januari 2016 hingga Januari 2018 dengan 700 atau 39,8% laki-laki dan 1060 atau 60,2% perempuan. Berdasarkan hasil tabulasi silang, diketahui bahwa responden dengan tingkat pendidikan sekolah dasar (SD) mengalami hipermetropi ringan (10,2%), responden dengan tingkat pendidikan sekolah menengah pertama (SMP) mengalami miopia ringan (6,8%), responden dengan tingkat sekolah menengah dan pendidikan sarjana mengalami miopia ringan (8%). Usia 6-15 tahun paling banyak mengalami Miopi Compositus (5,7%), miopia ringan 16-25 (10,2%), Miopi ringan 26-35 tahun (4,5%), miopia ringan 36-45 tahun (10,2%), 46- 55 tahun hipermetropia ringan (10,2%) dan 56-65 tahun hipermetropia ringan (5,7%). Uji Kruskal Wallis diketahui bahwa nilai sig yang diperoleh = 0,000 menunjukkan bahwa ada perbedaan kelainan refraksi berdasarkan pendidikan dan usia. Nilai sig chi square yang diperoleh adalah 0,021, menunjukkan bahwa ada hubungan antara jenis kelamin dan kelainan refraksi. Analisis multivariat mengungkapkan subjek perempuan menghambat risiko miopi ringan sebesar 0,157 kali subjek pria dan astigmatisme miopia compositus sebesar 0,082 kali subjek pria. Berdasarkan hasil penelitian diatas maka dapat disimpulkan hubungan antara miopia, astigmatisme dan hipermetropia dengan usia dan pendidikan tidak signifikan secara statistik. Faktor risiko miopia ringan dan astigmatisme miopia sederhana lebih rendah pada wanita dibandingkan pria. Hasil penelitian ini dapat membantu untuk lebih memahami pola kelainan refraksi dan perencanaan untuk program skrining tajam penglihatan prasekolah.

***Kata Kunci**: Kelainan refraksi, faktor risiko, usia, seks, pendidikan*

Relationship between Education, Sex, and Age with Refractive Errors at DR. Wahidin Soedirohusodo General Hospital

Abstract

The prevalence of refractive error and its relationship with education, age and sex at DR. Wahidin Soedirohusodo general hospital have not been comprehensively assessed. The aim of this study was to examined the distribution and risk factor of refractive errors at DR. Wahidin Soedirohusodo general hospital. Methods of this study used population based cross-sectional study. Respondents were interviewed and underwent standardised clinical eye examinations. Refractive error was determined by an automatic refraction device. Refractive errors are myopia, hyperopia and astigmatism. Myopia and hyperopia were defined as spherical equivalent of -0.50/+0.50 diopter (D) or worse, respectively; astigmatism was defined as cylindrical error >0.50 D. Total of 1760 patients with refractive error from January 2016 to January 2018 with 700 or 39,8% males and 1060 or 60.2% females. Based on the cross-tabulation output, it is known that the respondents with the most elementary level of education experienced mild hypermetropy (10.2%), the junior high school education experienced mild myopia (6.8%), high school and bachelor education experienced mild myopia (8%). Age 6-15 years experienced the most myopia compositus astigmatism (5.7%), 16-25 years mild myopia (10.2%), 26-35 years mild myopia (4.5%), 36-45 years mild myopia (10.2%), 46-55 years mild hypermetropia (10.2%) and 56-65 years mild hypermetropia (5.7%). Kruskal Wallis test it is known that the sig value obtained = 0,000 indicates that there are differences in refractive abnormalities based on education and age. Chi square sig value obtained is 0.021, indicating that there is a relationship between sex and refractive errors. Multivariate analysis revealed female subjects inhibited the risk of mild myopic by 0.157 times the male subjects and simple myopia astigmatism by 0.082 times the male subjects. The relationship of myopia, astigmatism and hypermetropia with age and education is not significant. The risk factor of mild myopia and simple myopia astigmatism decrease in female than male. These findings may help clinicians to better understand the patterns of refractive error and planning for preschool vision-screening programs.

Keywords : refractive error, risk factor, age, sex, education

INTRODUCTION

Refractive errors are very common and affect the majority of the population and resulting blurred image because of visual system imbalance the epidemiology of refractive errors has not been studied in at dr. Wahidin Soedirohusodo Mojokerto General Hospital, East Java, Indonesia. Population-based surveys in other regions of the world demonstrated that the prevalence of myopia tends to decrease with age, whereas the prevalence of hyperopia reveals the opposite tendency. (Pascolini and Mariotti, 2012; Wolfram *et al*, 2014; Katz *et al*, 1997). Reports of possible gender differences in the prevalence of refractive

errors have been controversial. Women have been found to be more hyperopic or more myopic. Other studies failed to confirm any gender differences. It is well known that myopia is more prevalent in Eastern Asian countries while European and American nations are mostly affected by hyperopia. Although racial and ethnic differences are the most important reason for differences in the prevalence of refractive errors, differences in lifestyle such as the amount of near vision tasks has also increased the global variation in the prevalence of refractive errors. In addition to creating personal issues, the treatment and correction of refractive errors imposes high costs on the community in different countries. (Fricke *et al*, 2012). In Indonesia, prevalence of refractive error is 22,1% of total population, and 15% is school age (Kempen *et al*, 2004). WHO has declared Global Action Plan (GAP) Towards Universal Eye Health 2014-2019 to decrease blindness (*World Health Organization,* 2013).

METHODS

A population based cross-sectional study. Population at ophthalmology outpatient clinic of DR. Wahidin Soedirohusodo Mojokerto General Hospital from January 2016 until January 2018. SAMPLE CRITERIA Subject with refractive error of myopia and hyperopia were defined as spherical equivalent of -0.50/+0.50 diopter (D) or worse, respectively; astigmatism was defined as cylindrical error >0.50 D, low primary myopia (SE -1.0D to -2.99D), moderate primary myopia (SE -3.0D to -5.99D), high primary myopia (SE -6.0D or more extreme), low hypermetropia (SE +1.0D to +2.99D) and moderate/high hypermetropia (SE + 3.0D or more extreme). Inclusion criteria if they were population-based, and data on refraction, together with age at measurement and year of birth, were available. Study participants were excluded if they were identified The Exclusion criteria are participants who reported having any eye surgery in the preceding 4 weeks or a current eye infection, retinal detachment, or other factors that might influence refraction (e.g. keratoconus)

Instrument Non-cycloplegic autorefraction was carried out using the Reichert RK 6000 auto refractokeratometer (Reichert., AMETEK, USA). The right eye was tested first, up to 10 refractive error measurements for each eye were taken and the most representative result automatically recorded. Information on socio-demographic factors (age, gender, ethnicity, and education) was reported at the time of

recruitment by questionnaire and face-to-face interview.

Data Analysis

Statistical analysis was performed using IBM SPSS version 20.0

RESULT

Total of 1760 patients with refractive error from August 2017 to January 2018.

Table 1. Types of refractive error patients August 2017-January 2018

No	Refractive error	Frequency (n)	(%)
1	Myopia	799	45.5
2	Hypermetropia	360	20.5
3	Astigmatism	601	34
Total		1760	100

Table 1 on the types of refractive abnormalities of patients in the eye polyclinic of Wahidin Soedirohusodo Mojokerto Hospital in the period of January 2016 - January 2018 showed that the highest incidence of refractive disorders was myopia as many as 799 patients (45.5%). Then followed by astigmatism is 601 patients (34%), and the last is hypermetropia patients (20.5%).

Table 2. Distribution of refractive error type from August 2017-January 2018

No	Refractive error	Frequency (n)	(%)
1	Mild Myopia	559	31.8
2	Moderate Myopia	200	11.4
3	High Myopia	40	2.3
4	Hypermetropia	380	20.5
5	Simple Myopia Astigmatism	241	13.6
6	Simple Hypermetropia Astigmatism	0	0
7	Compositus Myopia Astigmatism	180	10.2
8	Compositus Hypermetropia Astigmatism	0	0
9	Mixtus Astigmatism	180	10.2
	Total	1760	100

Table 3. Sex distribution of refractive error patient from August 2017-January 2018

No	Sex	Frequency (n)	(%)
1	Male	700	39.8
2	Female	1060	60.2
Total		1760	100

Table 4. Age distribution of refractive error patient from August 2017-January 2018

No	Age (years)	Frequency (n)	(%)
1	4-10	120	6.8
2	11-20	361	20.6
3	21-30	180	10.2
4	31-40	302	17
5	41-50	399	22.7
6	51-60	298	17
7	>60	100	5.7
Total		1760	100

Table 5. Bivariate Analysis

Variable	Sig
Education	0.000
• ES vs JHS	0.048
• ES vs SHS	0.002
• ES vs Bachelor	0.000
• JHS vs SHS	0.958
• JHS vs Bachelor	0.420
• SHS vs Bachelor	0.183
Age	0.000
• 6-15 Vs 16-25	0.052
• 6-15 Vs 26-35	0.030
• 6-15 Vs 36-45	0.008
• 6-15 Vs 46-55	0.219
• 6-15 Vs 56-65	0.105
• 16-25 Vs 26-35	0.417
• 16-25 Vs 36-45	0.458
• 16-25 Vs 46-55	0.000
• 16-25 Vs 56-65	0.000
• 26-35 Vs 36-45	0.685
• 26-35 Vs 46-55	0.000
• 26-35 Vs 56-65	0.000
• 36-45 Vs 46-55	0.000
• 36-45 Vs 56-65	0.000
• 46-55 Vs 56-65	0.168
Sex	0.021

ES: elementary school; JHS: junior high school; SHS: senior high school;

Education data, gender and age will be analyzed bivariately to see if there is a relationship with the variables of refraction abnormalities and multinomial regression to find out which variables affect the frequency disorder. Because the scale of the data used is categorical, for bivariate analysis uses the unpaired categorical comparative analysis, chi square, namely:

• 4x7 tables for educational relationships with refractive disorders

• 6x7 table for age relations with refractive abnormalities

• 2x7 table for age relations with refractive abnormalities.

The chi square test may be used if the conditions are met, namely the expected count value which is <5 maximum of 20% of the total cell. If the conditions are not met, the alternative test is Kruskal Wallis / Mann Whitney.

Multivariate analysis is used to find out what variables influence refraction

abnormalities. The test used is multinomial regression because the proportional odds assumption is not met. In this regression, which is used as a reference for the dependent variable and the independent variables of education, age and sex. Because there are 7 categories in the dependent variable, the equation that will be formed is 6 equations. In multinomial regression analysis, it is necessary to know whether the model obtained is suitable for use. The feasibility of the model can be seen from the fitting information model where the model is fit / fit if the value of p <0.05. From output it is known that the model we get is feasible (sig = 0,000)

Table 6. Mutivariate Analysis OR (CI)

Variable	ODS Mild Myopia	ODS Moderate Myopia	ODS Severe Myopia	ODS Mild Hyper-metropia	ODS simplex Myopia Astigmatism	ODS composite Myopia Astigmatism
Education						
• ES	–	–	–	–	–	–
• JHS	–	–	–	–	–	–
• SHS	–	–	–	–	–	–
Age (years old)						
• 6-15	–	–	–	–	–	–
• 16-25	–	–	–	–	–	–
• 26-35	–	–	–	–	–	–
• 36-45	–	–	–	–	–	–
• 46-55	–	–	–	–	–	–
• 56 -66	–	–	–	–	–	–
sex						
• female	0.157 (0.027- 0.929)	_	_	_	0.082 (0.013-0.534)	_
• male	–	–	–	–	–	–

The use of education, age and gender variables in predicting fraction abnormalities has a contribution of 76.8%. Furthermore, to find out which variables have partial influence on the dependent variable can be known from the Wald test, where the independent variable is said to affect the dependent variable if sig <0.05. Multivariate analysis on Table 6. revealed female subjects inhibited the risk of mild myopic by 0.157 times the male subjects and simple myopia astigmatism by 0.082 times the male subjects.

DISCUSSION

This study found the results as seen on table 1 the types of refractive abnormalities of patients in Ophthalmology clinic of DR. Wahidin Soedirohusodo Mojokerto Hospital in the period of January 2016 - January 2018

showed that the highest incidence of refractive disorders was myopia as many as 799 patients (45.5%). This is also consistent with research states that the most type of refractive disorder is myopia. (Fauziah *et al*, 2014; Isa, 2012) Likewise, research conducted on school-age children in Nepal found that the most refractive disorder was myopia. (Shrestha *et al*, 2011). Nazriati and Wijaya (2011) research also shows that the prevalence of myopia is the most frequent case of refractive disorder, then astigmatism is second followed by hypermetropia. (Nazriati and Wijaya, 2011). In table 3, the overall sample, female gender suffers more refractive disorders than men, with many samples each of 1060 people (60.2%) and 700 people (39.8%). This is in line with research conducted by Rodriguez and Romero (2014), found that the sex of the patient with refractive disorders occurs mostly in women. Another study from Bastanta (2010) also found that patients with the most refractive disorder occurred in women. Whereas the research conducted by Sewunet *et al* (2014) with multiple logistic regression analysis methods, it was found that women had a 3.9 times chance of experiencing refractive abnormalities. (Sewunet *et al,* 2014)

In this study it was found that from a population of 1760 patients who experienced refractive abnormalities, the age group 41-50 years was the age range most often experienced refractive abnormalities with a percentage of 22.7% (table 4). Based on the results of Isa's study, most patients with refractive disorders were in the 45-54-years age group. Likewise, in the study conducted by Bastanta (2010), the results showed that the most refractive disorder was in the age group 45-64 years. This is consistent with the results of this study where 41-50 years of age entered the age range where many refractive disorders occur. Rodriguez and Romero (2014) study states that the prevalence of hypermetropia and astigmatism will increase with age. (Rodriguez and Romero, 2014). The increase in the prevalence of hypermetropia with increasing age is caused by a decrease in accommodation power, a decrease in refractive index, and a decrease in axial length. At dr Wahidin Soedirohusodo general hospital, myopia was more likely in women than men in the 41–50 age. We also found the positive associations between myopia and higher educational achievement that have reported previously. The cross-sectional nature of the present study makes it difficult to assess causality in relation to these socio-

demographic factors or others of current interest such as near work activities, time spent in distance viewing and/or time spent outdoors.

The age-related increase in hypermetropia and higher frequency found in women. The finding in the present study that right eyes were on average more myopic has been reported, although not always convincingly, in other studies and right eyes have also been reported to have greater axial length (Mahroo *et al*, 2015*)*. Several limitations of our study should be considered in interpreting these results. First, results from our locally representative studies cannot be generalized to population. Second, our data do not address the prevalence of refractive errors for some groups of interest. For children and younger adults, no recent data were available, therefore the lack of data on this group is an important gap in our knowledge of the prevalence of refractive errors. Population-based studies of younger patients are needed to allow such estimates to be made.

Based on the cross-tabulation output in Table 6, it is known that the respondents with the most elementary level of education experienced mild hypermetrophy (10.2%), the respondents with the highest level of junior high school education experienced mild myopia (6.8%), respondents with the highest level of high school and S1 education experienced mild myopia (8%). The chi square condition was not fulfilled because the percentage was> 20% so that the Kruksal Wallis analysis was performed. From the results of the Kruskal Wallis test it is known that the sig value obtained = 0,000 indicates that there are differences in refractive abnormalities based on education. Therefore, it can also be said that there is a relationship between education and refractive disorders. Furthermore, it will be tested further with mann whitney to find out which education partner has different refractive disorders. Mann Whitney sig value obtained = 0.048 shows that there are differences in refractive abnormalities in respondents with primary and junior secondary education levels. Mann Whitney sig value obtained = 0.002 indicates that there are differences in refractive abnormalities in respondents with elementary and high school education levels. Mann Whitney sig value obtained = 0.000 shows that there are differences in refractive abnormalities in respondents with elementary and S1 education levels. Mann Whitney sig values obtained = 0.958 showed that there were no differences in refractive abnormalities in respondents with junior and

senior high school education levels. Mann Whitney sig value obtained = 0.420 shows that there is no difference in refractive abnormalities in respondents with junior and undergraduate education levels. Mann Whitney sig value obtained = 0.183 indicates that there is no difference in refractive abnormalities in respondents with high school and undergraduate education levels.

Based on cross tabulation output, it is known that respondents with age 6-15 years experienced the most Miopi Compositus (5.7%), respondents with 16-25 years of age experienced the most mild myopia (10.2%), respondents aged 26-35 years most experienced mild Miopi (4.5%), respondents with age 36-45 years experienced the most mild myopia (10.2%), respondents with age 46-55 years experienced the most mild hypermetropia (10.2%) and respondents with age 56-65 years, most experienced mild hypermetropia (5.7%). From the results of the Kruskal Wallis test it is known that the sig value obtained = 0,000 indicates that there are differences in refraction abnormalities based on age. Therefore, it can also be said that there is a relationship between education and refractive disorders. Furthermore, it will be tested further with mann whitney to find out which age partner has different refractive disorders. Mann Whitney sig values obtained = 0.052 showed that there were no differences in refractive abnormalities in respondents between the ages of 6-15 years and 16-25 years. There are differences in refractive abnormalities in respondents between the ages of 6-15 years and 26-35 years (0.030). There are differences in refractive abnormalities in respondents between the ages of 6-15 years and 36-45 years. (0.008). There is no difference in refractive abnormalities in respondents between the ages of 6-15 years and 46-55 years (0.219). There is no difference in refractive abnormalities in respondents between the ages of 6-15 years and 56-65 years (0.105). There is no difference in refractive abnormalities in respondents between the ages of 16-25 years and 26-35 years (0.417). There is no difference in refractive abnormalities in respondents between the ages of 16-25 years and 36-45 years (0.458). There are differences in refractive abnormalities in respondents between the ages of 16-25 years and 46-55 years (0,000). There are differences in refractive abnormalities in respondents between the ages of 16-25 years and 56-65 years (0,000). There is no difference in refractive abnormalities in respondents between the ages of 26-35 years and 36-45 years (0.685). There are

differences in refractive abnormalities in respondents between the ages of 26-35 years and 46-55 years (0,000). There are differences in refractive abnormalities in respondents between the ages of 26-35 years and 56-65 years; 36-45 years and 56-65 years; (0,000). There is no difference in refractive abnormalities in respondents between the ages of 46-55 years and 56-65 years (0.168).

Based on the cross tabulation output, it is known that female respondents experienced the most mild myopia ODS (20.5%) while the most male respondents also experienced mild myopia ODS (11.4%). The chi square condition is fulfilled because the percentage is <20% so that it can use chi square analysis. The sig value obtained is 0.021, indicating that there is a relationship between the sexes and refractive errors.

Model 1: Mild Myopia compared with Astigma Mixtus

Regression results obtained showed that in model 1, mild myopia compared to Astigma Mixus only female sex variables (1) were significant (sig = 0.041). The OR obtained was 0.157 which means that female subjects compared to men had the odds (odds) of mild myopic at 0.157 times Astigmatism Mixtus. In other words, female subjects inhibited the risk of mild myopic by 0.157 times the male subjects. The equation that is formed is:

$$Y_1 = 1.109 - 1.851\ Jk\ Perempuan$$

Model 2: Moderate Miopi Astigma Mixus Regression results obtained show that none of the variables are significant.

Model 3: High myopia compared to Astigmatism Mixtus Regression results obtained show that none of the variables are significant.

Model 4: Mild hypermetrophy compared to Astigma Mixus Regression results obtained show that none of the variables are significant.

Model 5: Astigmatism Miopi Simplex compared to Astigma Mixtus. Regression results obtained show that in model 5 that only female sex variables (1) are significant (sig = 0.009). The OR obtained was 0.082, meaning that female subjects compared to male had the odds of the risk of Astigmatism Miopi Simplex by 0.082 times Astigma Mixtus. In other words, female subjects inhibited the risk of Astigma Miopi Complex by 0.082 times the male subjects. The equation that is formed is

$$Y_5 = 17.734 - 2.497\ Jk\ Perempuan$$

Model 6: ODS Astigma Miopi Compositus compared to ODS Astigma Mixus with Presbiopi. Regression results obtained show that none of the variables are significant.

Study limitations is the generalizability of the findings to all Indonesian is uncertain

CONCLUSION

This study has been found that refractive errors myopia affect the majority of the population at ophthalmology outpatient clinic of DR. Wahidin Soedirohusodo Mojokerto General Hospital. The relationship of myopia, astigmatism and hypermetropia with age and education is not significant. The risk factor of mild myopia and simple myopia astigmatism decrease in female than male. These findings may help clinicians to better understand the patterns of refractive error and planning for preschool vision-screening programs. These findings may help clinicians to better understand the patterns of refractive error and planning for preschool vision-screening programs. Further investigation of risk factors is necessary to inform strategies for amblyopia prevention

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