is very limited. The only study conducted on the visual

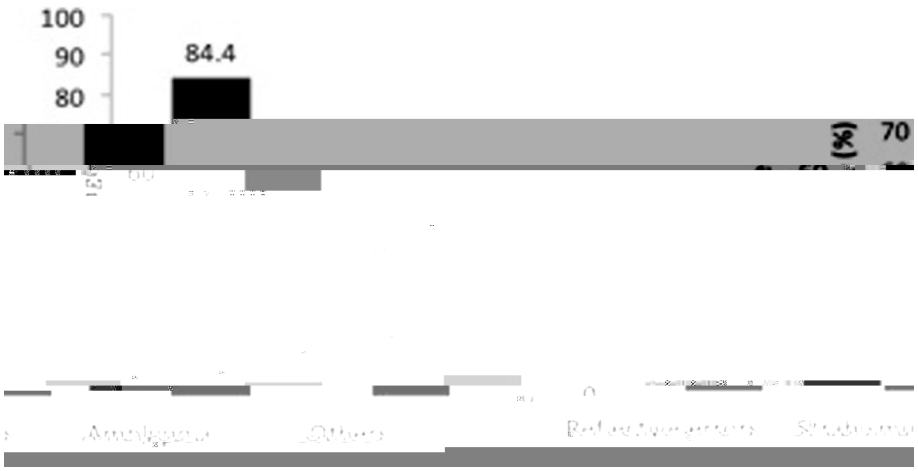

Fig. 1

children majority of them were diagnosed with refractive errors followed by amblyopia, strabismus and others ocular findings (Fig. 1).

Refractive errors and amblyopia

Thirty eight children were found to have refractive errors. For Level 1 age group, i.e. 7 to 9 years old, the mean spherical equivalent (SE) for RE was + 0.55 ± 0.63 (range – 1.00 D up to + 2.25 D) and for LE was + 0.54 ± 0.56 (range – 1.00 D up to + 1.75 D). For the Level 2 age group, 10 to 12 years old, the mean spherical equivalent (SE) for RE was + 0.27 ± 0.71 (range – 2.00 D up to + 1.75 D) and LE was + 0.31 ± 0.65 (range – 1.75 D up to + 1.75 D). Table 2 shows the spherical equivalent of the refractive errors. Correlation analysis on the age groups and on the SE of RE and LE was done. The results showed that there were significant relationships between the age groups and the SE ($p = 0.005$) for hyperopia. In this study, the ammetropia distribution pattern for refractive errors leaned towards hyperopia. A total of 31 (28.2%) children with almost equal number of female and male were found to have hyperopia. Six Orang Asli children had myopia and female had twice more incident of myopia compared to male Orang Asli children. Only one (0.9%) Orang Asli children had anti-metropia from the Level 2 age group. After using spectacles for 6 weeks, 3 (2.7%) children were not able to achieve a visual acuity of 6/6 monocularly and were diagnosed to have refractive amblyopia. Table 3 shows the distribution of types of refractive errors, amblyopia, strabismus and ocular abnormality among Orang Asli children.

Strabismus

Three children failed the Cover Test and Hirschberg's Test during vision screening and were referred for further examination by an Ophthalmologist. After this examination, the children were found to have strabismus i.e. exotropia at 6 m fixation and were from the Level 1 age group (7 until 9 years old). Two of these children were male. Thus, the strabismus prevalence (all causes) among Orang Asli children in this study was 1.8% (Table 3).

Ocular abnormality

Ocular abnormalities are all abnormal findings other than those mentioned earlier and include any structural or anatomical abnormalities of the eye. The prevalence of ocular abnormalities for this study was 1.8% i.e. involving two children. Both these children were male and one of them, aged 7 years old, was found to have a high cup-to disc ratio while the other had anisocoria (unequal pupil size) between his two eyes (Table 3).

Discussion

In general, the causes of vision impairment among Orang Asli children in this study included refractive errors, amblyopia, strabismus and ocular abnormalities. These findings were similar to the study conducted by Zainal et al., (2002) [21]. However, there is some

difficulty in discussing the causes of vision impairment among Orang Asli children because there have been limited vision status or profile studies conducted in Malaysia. Refractive errors were the major cause of vision impairment (34.5%) among Orang Asli children. This is in agreement with the findings of The National Eye Survey 1996 which identified 48% of Malaysians, especially children aged 7 years and above, have uncorrected refractive errors [21].

In this study involving Orang Asli of the Temuan tribe, hyperopia was the leading cause (28.2%) of refractive errors followed by myopia (5.5%). Further analysis showed that there was a significant correlation between SE refractive errors with age for hyperopia. It was also noted that the descriptive data showed an increase in percentage of refractive errors as age increases for hyperopia. This is in contrast to other studies conducted among other Malaysian ethnicities [22–24] such as Malay, Chinese or Indian children, in which myopia was the leading cause of refractive errors, where these errors ranged from 4% [14] to 17.1% [25], these studies being conducted on preschool and secondary school children respectively.

Amblyopia was also another cause of vision impairment among these Orang Asli children, and if undetected and corrected could affected the children ability to do well in school. Amblyopia is a condition where visual acuity is worse than 6/6 without the presence of any organic cause or ocular pathology [26]. The prevalence of amblyopia among these Orang Asli children was 2.7%. This is in agreement with a study conducted among school children aged 7 years and above, in the Gombak District in Malaysia where they found the prevalence was 3% [25]. Our findings were higher when compared to other studies conducted among school children in Singapore, South Korea and Netherlands which ranges from 0.4 to 2% [27–30]. Holmes & Clarke recommended that early stage intervention should be provided for children with amblyopia, ideally before the age of 8 years old so that they would have better prognosis [26]. Where possible, screening should be done as early as possible, at between 2 to 4 years old, to provide the best visual recovery.

The prevalence of strabismus and ocular abnormalities was found to be 1.8 and 2.7% respectively in this study. The prevalence pattern for these impairments was similar to that found in most countries. This is because strabismus and ocular abnormalities are quite easily identified by parents in the early stages because the impairment has clear signs and symptoms. Therefore, parents often seek treatment for the problem as soon they notice it.

Understanding and determining the prevalence and causes of vision impairment among Orang Asli school children will provide a clearer picture of their visual status needs. Hence proper and early intervention should be provided in the medical health services provided to the Orang Asli community especially with regards vision care. The visual impairment issues particularly refractive errors can be easily addressed and thus avoidable blindness can then be easily rectified.

Conclusion

The prevalence of visual impairment among Orang Asli children in this study was 34.5% where the main cause was refractive errors. The main cause of refractive errors found to be hyperopia (28.2%) followed by amblyopia (2.7%), strabismus (1.8%) and ocular abnormalities (1.8%). Hyperopia, which is associated with symptoms such as asthenopia, frontal headache and blurred vision at near tasks among children, may results in these children avoiding near work such as writing or reading. Thus, vision screening and a comprehensive eye examination is very important and needs to be done on all

Funding
The authors acknowledged the financial assistance for publication received from the Universiti Kebangsaan Malaysia Research University Grant AP-2017-004/3.

Availability of data and materials
The data used in this study is available with the author.

About this supplement
This article has been published as part of BMC Public Health Volume 19 Supplement 4, 2019: Health and Nutritional Issues Among Low Income Population in Malaysia. The full contents of the supplement are available online at https://bmcpublichealth.biomedcentral.com/articles/supplements/volume-19-supplement-4.

Authors' contributions
RO designed the manuscript construct, interpreted investigative data, wrote the manuscript and critically reviewed the manuscript, WMHWA examined the children, analyzed and interpreted investigative data, VFK designed the manuscript construct, critically reviewed the manuscript. All authors have read and approved the final manuscript.

Ethics approval and consent to participate
This study received approval from University Kebangsaan Malaysia Research Ethics Committee UKM 1.5.3.5/244/SPP2. Parental informed consent was obtained prior to data collection.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

Publisher's Note

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Published: 13 June 2019

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