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KNOWLEDGE, ATTITUDE AND PERCEPTION OF SPECTACLE USE AMONG SENIOR HIGH SCHOOL STUDENTS IN GHANA

DR. OSEI BOAITEY

OD/MPH/CHES/MCHES

Abstract: **A spectacle which is a corrective lens is typically worn in front of the eye to improve vision. The most common use is to correct refractive errors. In 2006, 153 million people were living with uncorrected refractive error, as reported by the World Health Organization. Of these, 13 million are children and 45 million are adults.2-5 Furthermore, 90% of people with uncorrected refractive error live in low income countries. Visual impairment as a result of uncorrected refractive error may make present a challenge in obtaining certain jobs which brings it economic effect of individuals. The study was a carried out in schools and it was a cross-sectional study of students attending senior high schools in Ejisu-Juaben Municipal which is one of the 30 administrative and political Districts in the Ashanti Region of Ghana. 315 respondents were selected by systematic and simple random sampling. This study concludes that students do not have adequate knowledge on spectacle use among senior high school students in the Ejisu Juaben District of Ghana. The study also concludes that the perception of students on spectacle use lack any scientifically proven ideas which inform them. Their attitudes may also discourage their friends from putting on spectacles when it is needed. It is recommended that cost-effective strategies for vision screening of school children be incorporated into the school health program of the Ministry of Health and the Ministry of Education together with health education and promotion resources.**

Keywords: **Education, students, Health, World Health Organization.**

1. INTRODUCTION

A spectacle which is a corrective lens is typically worn in front of the eye to improve vision. The most common use is to correct refractive errors; myopia, hypermetropia, astigmatism, and presbyopia. According to the World Health Organisation, (1997), uncorrected refractive error is one of the major causes of avoidable visual impairment. In 2006, 153 million people were living with uncorrected refractive error, as reported by the World Health Organization. Of these, 13 million are children and 45 million are adults.2-5 Furthermore, 90% of people with uncorrected refractive error live in low income countries.

As a result of impairment of vision, students perform below their capacity and some are not be able to complete their education. Visual impairment as a result of uncorrected refractive error may make present a challenge in obtaining certain jobs which brings it economic effect of individuals.

Many research studies have shown numerous effects on uncorrected myopia on individuals. Abnormal or adverse ocular changes in degenerative myopia can include vitreous liquefaction, posterior vitreous detachment and peripapillary atrophy appearing as temporal choroidal or sclera crescents or rings around the optic disc (Goldschmidt, 1990).

According to Celorio, (1991), other adverse ocular changes also includes lattice degeneration in the peripheral retina, tilting or malinsertion of the optic disc, usually associated with myopic conus, thinning of the retinal pigment epithelium with resulting atrophic appearance of the fundus, ectasia of the sclera posteriorly (posterior staphyloma), breaks in Bruch's membrane and choriocapillaris, resulting in lines across the fundus called "lacquer cracks", and Fuchs' spot in the macular area.

Myopia may have substantial social, educational, economic and personal consequences (Orfield, 2007; Saw, et al 1996). The American Optometry Association, (1997) indicates that because myopia is associated with reduced distance vision without optical correction, it can be a limiting factor in occupational choices.

2. LITERATURE REVIEW

Ayanniyi et al (2008) conducted a study to evaluate challenges, attitudes and practices among spectacle wearers to effect positive change when necessary, and determine positive change in a resource-limited economy. This was a multi-hospital descriptive, cross sectional survey of spectacle wearers was conducted between May 2007 and December 2008 in Nigeria.

A total of 214 wearers comprising 43.5% males and 56.5% females aged 18-84 years were surveyed. The majority of subjects (92.6%) had at least secondary education. The wearers' challenges included expensive spectacles (43.0%), falling/scratched/broken lenses (29.4%) and fear that spectacles would damage the eyes (23.8%). The wearers' attitudes were comprised of consultations with 'road side dispensers' (7%) and permitting other individuals to select spectacle frames for them (26%).

Care and maintenance practices in this research included use of handkerchief, tissue paper, fingers and water to clean spectacles (49.5%) and placing spectacles inside spectacle cases (30.4%). There were no associations ($P > 0.05$) between gender or literacy levels and who selected the frames for the subjects, caregivers consulted for spectacles, and cleaning materials for spectacles. The placement of spectacles when not in use was significantly associated ($P < 0.05$) with the wearers' gender and literacy levels but not with the length of spectacle wear.

Researchers concluded that attitudes and practices requiring positive change crossed gender and educational levels among spectacle wearers. They also emphasized that cost of spectacles should be regulated and availability of standard eye care practices would reduce challenges including lens-related defects and quackery. Researchers also saw a need that consultation with a recognized eye care professional, counseling of wearers on positive attitudes/practices as well as allaying fear of spectacle wear is required.

Li et al (2010) used focus groups to understand barriers to glasses use among children in rural China. Separate focus groups were conducted between December 17, 2007, and August 5, 2008, for the following 3 groups at each of 3 schools in rural China: children aged 14 to 18 years with myopia of less than −0.5 diopters in both eyes, those children's parents, and those children's teachers. Participants were also asked to rank their responses to questions about glasses use. The focus group transcripts were coded independently by 2 investigators using qualitative data management software.

Respondents of all 3 types indicated that glasses purchase and wear should be delayed in children with early myopia and might be harmful to the eyes. Parents and students reported being uncertain about children's actual myopia status and whether glasses should be worn. Parents ranked their most common reason for not buying glasses as being "too busy with work," whereas "too expensive" ranked low. Inconvenience was ranked as an important reason for not wearing glasses among all 3 student groups. "Accuracy of lens power" was the first-ranked requirement for glasses among all student groups, whereas "new and attractive styles" was ranked last by all.

All 3 types of respondents believed that wearing glasses or failing to wear them might worsen myopia. Researchers concluded that educational programs are needed to address significant knowledge gaps in families and schools about glasses use in rural China. Cost and the need for attractive styles may not be significant barriers to use in this setting, raising the possibility of paying for such programs through cost recovery.

To determine the attitude and beliefs of Nigerian undergraduates to spectacle wear Ebeigbe and Okafor (2013). This was a cross sectional study of 500 undergraduates of the University of Benin, Nigeria. Age range was from 18 to 30 years, mean age 23 ± 2.7 years. There were 269 males and 231 females.

Methodology used was a semi structured questionnaires were distributed to the participants and collected same day after completion. Two-thirds (68%) of the total population studied had not heard of refractive error. About a third (38%) believed wearing eyeglasses was one of the methods used to correct refractive error. Half (50%) believed they would wear spectacles if prescribed with one by their doctor.

Sixty-four percent believed eyeglasses are harmful to the eyes; and 65% did not know that eyeglasses could be used to relieve other forms of ocular discomfort like headache and tearing. Fifty-seven per cent of respondents saw people who wore eyeglasses as visually handicapped, while 60% believed that eyeglasses were meant for old people. Majority of the respondents (56%) believed that they would be teased if they wore glasses.

Researchers concluded that knowledge of refractive errors and acceptance of glasses for the correction of refractive errors among Nigerian undergraduates is not encouraging. Public enlightenment programs to promote benefits of wearing prescribed spectacles are needed.

Savur (2011) studied the perceptions of refractive errors and to investigate their psychosocial effect on youth. A descriptive questionnaire based study was conducted on unmarried youth in the age group of 18-25 years over a period of two months. The questionnaire elicited details like demography, various other modalities which were used by the respondents for the correction of the refractive errors, their perception about wearing spectacles and the psychosocial problems which they faced.

Researchers concluded that despite a high level of education, the perceptions regarding the refractive errors varied, with a large number of people having wrong perceptions and attitudes towards refractive errors especially towards spectacle use, which resulted in psychological distress.

Background: Refractive error is the most common cause of blindness which can be corrected easily using simple modality like spectacles but because of ignorance, stigmas and cost related issues it is underutilized.

To study to assess the psychosocial aspects of refractive error and effectiveness of health education in correcting stigmas related to spectacle use in high-school students of rural India, Dhoble et al (2013). This was a cross sectional study in which total of 255 high school students from a school near Bhopal were included. The responses were recorded on a pre-designed and pre-tested questionnaire. The health education was provided to all the participants and they were reassessed after one month using same questionnaire.

Amongst total of 255 students, 165 were males and 90 were females. During initial phase most of the respondents believed that common reasons for low vision were nutritional deficiency (68%) and bad eye care (56%). The respondents refused to use spectacles at all if needed as spectacles are cosmetically unacceptable (62%) , fear of rejection from opposite sex (54%) and likely teasing from colleagues (36%).

Following health education there were statistically significant changes in the knowledge, attitude and care seeking behaviour of spectacle use. Only two parameters i.e. cosmetic acceptance of spectacles and that traditional methods were more than spectacles did not changed significantly. The study concluded that prevalent stigmas regarding spectacle use among students of rural India were effectively corrected with health education.

3. METHODOLOGY

The study was a carried out in schools and it was a cross-sectional study of students attending senior high schools in Ejisu-Juaben Municipal which is one of the 30 administrative and political Districts in the Ashanti Region of Ghana.

The Municipal is known globally for its rich cultural heritage and tourists attractions notably the booming kente weaving industry. The total number of students in the six schools is around 5000.

The district has six senior high schools. These are Tweneboa Kodua Secondary School, Juaben Secondary School Ejisuman Secondary School Ejisu Secondary Technical School Bonwire Secondary Technical School Achinakrom Secondary School Church of Christ Senior High School. 315 respondents were selected by systematic and simple random sampling.

4. RESULTS

Table 1.0 showing the knowledge of spectacle use among students

KNOWLEDGE OF SPECTACLE USE	YES	NO	NOT SURE
Spectacles are used to help people with vision problems see clearly.	282	22	11
A spectacle is always supposed to correct the eye in order to see without lenses.	279	24	12
Eye drops can be used as an alternative to spectacles.	60	197	58
Wearing spectacles can make you dependent on it.	202	62	51
Spectacles can relieve different forms of discomfort like headache and tearing.	67	227	21

Table 1.1 showing the attitude of spectacle use among students

ATTITUDE OF SPECTACLE USE	STRONGLY AGREE	AGREE	NEUTRAL	DIASAGREE	STRONGLY DISAGREE
I have confidence or trust in people who put on spectacles.	151	88	26	24	26
I will put on spectacles anyway if it helps me in my academics.	155	92	27	19	22
I won't use spectacles because of teasing from colleagues.	149	87	34	26	19
A spectacle is a cosmetic blemish	36	108	83	67	21
I would hide spectacles from opposite sex because of fear of rejection.	207	64	42	1	1

Table 1.2 showing the perception of spectacle use among students

PERCEPTION OF SPECTACLE USE	STRONGLY AGREE	AGREE	NEUTRAL	DIASAGREE	STRONGLY DISAGREE
I perceive people who wear spectacles as responsible.	5	39	223	39	9
I perceive people who wear spectacles as smart or intelligent	183	74	39	9	10
Spectacles are meant for old people	204	81	25	3	2
People wearing glasses as visually handicapped	262	32	19	1	1
Wearing spectacles can make one's eye look bigger or smaller	241	46	17	4	7

5. DISCUSSION

Knowledge of spectacle use:

In the knowledge of spectacle use, 90% of students taught spectacles are used to help people with vision problems see clearly whiles 7% taught otherwise whiles 3% of the students were not sure. A significant number of students knew of the importance and the use of spectacle correction. Although the 90% of students were a significant number, there is a call for some concern for those who either did not know or were not sure of the use of spectacles since spectacles are commonly used widely in Ghana.

There was a significant number of students (89%) taught a spectacle is always supposed to correct the eye in order to see without lenses whiles 8% taught otherwise. 3% of students however were not sure if a spectacle is always supposed to correct the eye in order to see without the lenses for some time to come. This shows wrong information from students to believe that a spectacle is always supposed to correct the eye at a time where the wearer need not depend on the spectacle.

19% of students taught that eye drops can be used as an alternative to spectacles. A significant proportion (63%) however taught eye drops were not substitute for spectacles. 18% of the students however were not sure if eye drops can be used as a substitute for spectacle use. A total proportion of 37% could not provide the accurate answer to the this question. A good proportion of the students are not aware of the fact that refractive error can be corrected by spectacles whiles eye drops are mostly used to treat infection, inflammation and of tissues of the eye unrelated to refractive error.

64% of the students taught wearing spectacles can make you dependent on it, whiles 16% taught otherwise and 20% were not sure. Wearing spectacle does not necessarily make one dependent on it. A significant proportion of students inferentially think that one who puts on spectacles may decide to stop wearing it in order to go about visual activities without being dependent on it. The purpose of the spectacle is just to bring images of objects onto the retina in order to achieve sharp retinal images. Such students may decide not to put on spectacles when they are prescribed by an eye clinician.

21% of students taught that spectacles can relieve different forms of discomfort like headache and tearing. 72% however expressed that spectacles cannot relieve different forms of discomfort like headache and tearing. Discomfort which comes from spectacle (asthenopia) could help as a good motivator in spectacle acceptance. Some individuals are able to achieve an appreciable vision at the expense of headache and eye discomfort. Inculcating the knowledge of asthenopia in health education can serve as a motivational factor for individuals to accept spectacle.

Attitude of spectacle use:

A significant amount of students (48%) of students strongly have confidence or trust in people who put on spectacles. 28% did have some confidence or trust in people who put on spectacles. 16% however did not have confidence or trust a friend merely by the fact that they wear spectacle. This shows that although students may have negative perception and attitude about spectacles, a significant number have an attitude of trust and confidence on those who put on spectacles. This can serve as a motivation factor towards health education on spectacle usage.

78% of students said they will put on spectacles anyway if it helps them in their academics whiles 13% said they were not going to wear their spectacles if it helps them in their academics. 9% of students were however not sure if they will put on spectacles if it helps them in their academics. This shows a significant number of students are ready to put on spectacles despite any negativity associated with spectacles as long as it will improve their academics.

75% were not going to use spectacles because of teasing from colleagues whiles 14% were going to ignore teasing from colleagues. 11% of students were not sure if they were going to use spectacles when they are teased by friends. This shows a significant number of students who will put down their spectacles if they do not get the affirmation from friends and are subject to ridicule.

46% of the students taught spectacles were a form of a cosmetic blemish with 12% of students feeling so strongly about this. 28% of students however did not agree spectacles were a form of cosmetic blemish whiles 26% of students were not sure about this. A significant number of students somehow agreed spectacles was a form of cosmetic blemish against those who taught it was not a cosmetic blemish. There was however no significant difference between those who were not sure if a spectacle was a cosmetic blemish against those who taught it was not a cosmetic blemish.

86% of students will hide spectacles from opposite sex because of fear of rejection whiles 13% were not sure if they were going to do that. Only 1% of students were however not going to hide spectacles from opposite sex because of fear of rejection. This indicates a significant amount of students who are influenced by the opposite sex factor of embarrassment.

Perception of spectacle use:

71% of students were not sure if they perceived people who wear spectacles as responsible or otherwise. Almost equal proportions of students did agree or disagreed of perceiving people who wear spectacles as responsible. There was a significant number of people who did neither perceive people who wear spectacles as responsible or otherwise. Wearing spectacles or not did not change their perception on an individual to be responsible or irresponsible.

81% of students perceive people who wear spectacles as smart or intelligent while 7% disagreed. 12% of students however neither perceived people who were spectacles as intelligent or otherwise. This shows a significant number of students who perceived spectacles wearers as smart or intelligent. This may serve as a good motivation for people who put on spectacles which can facilitate the work of health educators involved in refractive error education.

A significant amount of students (81%) felt spectacles are meant for old people. Out of that proportion 65% had a strong perception. 2% of students however did not agree that spectacles were meant for old people. 6% of students however took a neutral position on this perception. Thus a significant amount of people have a strong perception that spectacles is meant for the aged.

The proportion (93%) of students who perceived people wearing glasses as visually handicapped was significant. There was also a significant proportion (83%) having strong perception that those who put on spectacles are handicapped in their sight. Only 1% disagreed with this perception with 6% of students taking a neutral position on this matter.

A significant proportion of students (82%) taught spectacles can make one's eye look bigger or smaller with a significant proportion of 77% having strong perception about this matter. Only 3% of students however did not agree to this perception whiles 5% took a neutral position.

6. CONCLUSION

This study concludes that students do not have adequate knowledge on spectacle use among senior high school students in the Ejisu Juaben District of Ghana. The study also concludes that the perception of students on spectacle use lack any scientifically proven ideas which inform them. Their attitudes may also discourage their friends from putting on spectacles when it is needed.

7. RECOMMENDATIONS

It is recommended that cost-effective strategies for vision screening of school children be incorporated into the school health program of the Ministry of Health and the Ministry of Education together with health education and promotion resources.

Counseling services should be strengthened from basic education through to senior high school to give support to spectacle wearers who may encounter unfavourable attitudinal feedback from their peers.

REFERENCES

[1] Adegbehingbe, B.O., Oladehinde, M.K., Majemgbasan, T.O., Onakpoya, O.H., Osagiede, O.E., (2005). Screening of adolescents for eye disease in Nigerian high schools. *Ghana Medical Journal*, 39:138-42.

[2] Ahuamao, C. and Atowa, U.C. (2004). Distribution of refractive errors among school children in Abia State of Nigeria [online]. *Journal of the Nigerian Optometric Association.* Volume 11. [online]. Available at: http//www. ajol.info/index.php/jnoa/article/ [Accessed 29th May 2013].

[3] American Optometry Association (1997). Care of the patient with myopia. [online] Available at: http://www.aoa. org/documents/CPG-15.pdf [Accessed 24th May 2013].

[4] American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders, 4th ed. Washington, DC.

[5] Balacco-Gabrieli, C., Tundo, R., (2000). A study on the effect of some steroid hormones in degenerative myopia, *Doc Ophthalmol Proc Ser* 28: 129-134, referenced in Proceedings of the 7th International Conference on Myopia, Springer, p.95.

[6] Borish, I.M. (1970). Clinical Refraction, 3rd ed. Chicago: Professional Press.

[7] Bradley, D.V., Fernandes, A., Tigges M, Boothe, R.G., (1996). Diffuser contact lenses retard axial elongation in infant Rhesus monkey. *Vis Res* 36: 509-514.

[8] Chaudhry, R., Ali, H. and Sheikh N. H., (2011). Frequency and underlying factors of myopia among medical students [online]. *Biomedica*, 27:154–60. [online]. Available at: http://www.thebiomedicapk.com/articles/273.pdf [Accessed 26th October, 2012].

[9] Chow, Y. C., B. Dhillon, P. T. K., Chew, et al. (1990). Refractive errors in Singapore medical students. *Singapore Medical Journal* 31: 472-473.

[10] Chung, K.M., Yeow, P.T., Norhani, M., Oleary, D.J., (1995). The association between Myopia and gender in Chinese School Children. *Sains Malaysiana*, 24(3): 67-71.

[11] Cordain, L., Eaton, S. B., Miller, J. B., Lindeberg, S., & Jensen, C., (2002). An evolutionary analysis of the aetiology and pathogenesis of juvenile-onset myopia. *Acta Ophthalmologica Scandinavica*, 80:125-35.

[12] Curtin B.J. (1985). The myopias: basic science and clinical management. Philadelphia: Harper & Row, 1985:237-435.

[13] Dandona R. D., Naduvilath T. J., Catherine A., McCarty M., and Gullapalli N., (1999).Refractive Errors in an Urban Population in Southern India: *The Andhra Pradesh Eye Disease Study. Invest. Ophthalmol. Vis. Sci*, 12:2810-2818.

[14] Dobson, J. P., (1949). Emotional background of myopia. *Journal of Aviation Medicine*, 20:365-70.

[15] Drexler W., Findl O., Schmetterer L., Hitzenberger C.K., Fercher A.F., (1998). Eye elongation during accommodation in humans: differences between emmetropes and myopes, *Invest Ophthalmol Vis Sci* , 39(11): 2140-2147.

[16] Edwards, M.H., (1998). Effect of parental myopia on the development of myopia in Hong Kong Chinese', *Ophthalmic & Physiological Optics*, 18:477-483.

[17] Elias, M.J., (1989). Schools as a Source of Stress to Children: An Analysis of Causal and Ameliorative Influences. *Journal of School Psychology*, 27 (4), 393-407.

[18] Epstein D., (1983). Accommodation as the primary cause of low luminance myopia-experimental evidence. *Acta Ophthalmolgica*, 61:424-30.

[19] Goldschmidt E., (1968). On the etiology of myopia. An epidemiology study. *Acta Ophthalmolgica*, 98:1-172.

[20] Goss D.A., Eskridge J.B., (1987). Myopia. In: Amos J.F, ed. Diagnosis and management in vision care. Boston: Butterworths, 121-71.

[21] Grosvenor T., Goss D.A, (1998). Role of the cornea in emmetropia and myopia. *Optom Vis Sci*, 75: 132-145.

[22] He, M., Xu, J., and Yin, Q., (2005). Need and challenges of refractive correction in urban Chinese school children. *Opto Vis SCi*. 82:229-234.

[23] Jones, L.A., Loraine, T.S., Donald, O.M., Mitchell, G.L., Melvin, L.M., and Zadnik, K. (2007). Parental History of Myopia, Sports and Outdoor Activities, and Future Myopia [online]. *Invest Ophthalmol Vis Sci*. 48:3524–32. [online]. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2871403/ [Accessed: 4th June 2013].

[24] Katz (2009). A new look on myopia: Possible links with childhood stress. [online]. Available at:http://www.columbiastate.edu/File/Faculty%20Webpages/Louise%20Katz/Myopia%20Web%20Manuscript%208-13-09.pdf. [Accessed: 5th June 2012].

[25] Kempen J.H., Mitchell P., Lee K.E., Tielsch J.M. (2004). The prevalence of refractive errors among adults in the United States, Western Europe, and Australia. *Arch Ophthalmol.*;122:495–505.

[26] Khader, Y.S., W.Q., Batayha, S.M.I., and Al-Shiekh-Khalil, M.I., (2010). Prevalence and risk indicators of myopia among schoolchildren in Amman [online]. *Jordan Eastern Mediterranean Health Journal*, 12:3-4. [online]. Available at http://applications.emro.who.int/emhj/1203_4/12_3-4_2006_434_439.pdf [Accessed: 23rd May, 2013].

[27] Kee, C.S., Hung L.F., Qiao-Grider, Y., Ramamirtham, R., Winawer J., (2007). Temporal constraints on experimental emmetropization in infant monkeys. *Invest Ophthal Vis Sci*, 48: 957-962.

[28] Klaus Schmid (2013). Myopia Manual Edition January 2013

[29] Lam, C. S. Y., Edwards, M.H., Millodot M. (1999). A 2-year longitudinal study of myopia progression and optical component changes among Hong Kong school children. *Optometry and Vision Science*, 76(6): 370-380.

[30] Lam, C.Y.S., Goldschmidt, E., Edwards, M.H., (2004). Prevalence of myopia in local and international schools in Hong Kong. *Optom. Vis. Sci*. 81(5): 317-322.

[31] Larsen J.S., (1979). Axial length of the emmetropic eye and its relation to the head size. *Acta Ophthalmol*,57:76-83.

[32] Liberman, J., (1995). Take off your glasses and see: A mind/body approach to expanding your eyesight and insight. New York: Three Rivers Press.

[33] Lin, N., Ensel, W. M., (1989). Life stress and health: Stressors and resources. *American Sociological Review*, 54*:*382–399.

[34] Lin, L.L., Shih Y.F., Hsiao C.K., Chen, C.J., (2004). Prevalence of myopia in Taiwanese schoolchildren: 1983 to 2000. *Ann Acad Med Singapore*, 33:27–33.

[35] Lin, L.L., Shih, Y. F., and Hsiao, C. K., (2001). Epidemiologic study of the prevalence and severity of myopia among schoolchildren in Taiwan in 2000. *Journal of Formos Medical Association*, 100(10): 684-691.

[36] Locke L.C., (1987). Induced refractive and visual changes. In: Amos JF, ed. Diagnosis and management in vision care. Boston: Butterworths, 313-67.

[37] Mabaso, R.G., Oduntan A.O., Mpolokeng M.B.L., (2006). Refractive status of primary school children in Mopani District, Limpopo Province, South Africa. *S Afr Optom*, 65:125 –26.

[38] Mallen, E.A, et al. (2006) Transient Axial Length Change during the Accommodation Response in Young Adults. Invest Ophthalmol Vis Sci.47(3):1251-4.

[39] Marmot, M., and Wilkinson, R. G., (1999). *Social determinants of health.* Oxford, England: Oxford University Press.

[40] Mavracanas, T. A., Mandalos, A. and Peios, D., (2000). "Prevalence of myopia in a sample of Greek students." *Acta Ophthalmologica Scandinavica* 78: 656-59.

[41] Morgan, I. and Rose, K., (2005). How genetic is school myopia? *Progress in Retinal and Eye Research*, 24:1-38.

[42] National Scientific Council on the Developing Child. Cambridge: The Council: 2005 [cited 2007 April 9]. Excessive stress disrupts the architecture of the developing brain. Working Paper No. 3. [online].Available from: http://www. developingchild.net/pubs/wp/Stress_Disrupts_Architec-ture_Developing_Brain.pdf.[Accessed: 20th April, 2012].

[43] Orfield A., (2007). *Eyes for learning: Preventing and curing vision-related learning problems.* Rowman & Littlefield Education.

[44] **Ovenseri-Ogbomo G. O and Assien R.,** (2009). Refractive error in school children in Agona Swedru, Ghana. *The South African Optometrist* 69:86-92. [online]. Available at: http://www.saoptometrist.co.za/OVENSERI_JUN10.pdf [Accessed: 5th June, 2013].

[45] Ovenseri-Ogbomo G. O and Omuemu V. O., (2010). Prevalence of refractive error among school children in the Cape Coast Municipality, Ghana. *Dovepress. Clinical Optometry* 259–66. [online]. Available at *http://*www. dovepress.com/getfile.php?fileID=6793. [Accessed: 4th June, 2013].

[46] Owens D.A and Leibowitz H.W., (1976). Night myopia: cause and a possible basis for amelioration. *Am J Optom Physiol Opt*, 53:709-12.

[47] Pan C.W., Ramamurthy D. and Saw S.M., (2011). Worldwide prevalence and risk factors for myopia. Ophthalmic Physiol Opt 2012, 32, 3–16. [online]. Available at: http://onlinelibrary.wiley.com/doi/10.1111/j.1475-1313.2011. 00884.x/pdf [Accessed: 2nd March, 2012].

[48] Pararajasegram, R., (1999). Vision 2020-the right to sight: from strategies to action. *AmJ Ophthal* 128:357-358.

[49] Parssinen, O. and Lyyra A.L., (1993). Myopia and myopic progression among schoolchildren: a three-year follow-up study. Invest Ophthalmol Vis Sci. 34:2794-802.

[50] Peters, H.B., (1961). The relationship between refractive error and visual acuity at three age levels. *Am J Optom*; 38:194-8.

[51] Perkins, E.S., (1979). Morbidity from myopia. *Sight-Saving Rev*; 49:11-9.

[52] Resnikoff, S., Pascolini D., Mariotti S.P., Pokharel G.P (2004).. Global magnitude of visual impairment caused by uncorrected refractive errors in 2004.*Bull World Health Org*. 86:63–70.

[53] Rosmond R. and Bjorntorp P., (2000). Low cortisol production in chronic stress, *Lakartidningen*, 97(38): 4120-4.

[54] Rose, K.A., Morgan I.G., Kifley, A., Huynh, S., Smith, W., Mitchell, P. (2008). Outdoor Activity Reduces the Prevalence of Myopia in Children [online]. *American Academy of Ophthalmology.* 115:1279–128. [online]. Available at http://myscienceplace.org/uploads/3/0/8/2/3082677/outdoor_activity_myopia_rose.pdf [Accessed: 23rd December, 2012].

[55] Rose K .A., Morgan I.G., Smith, W., Burlutsky, G., Mitchell, P. Saw, S-M. (2008). Myopia, Lifestyle, and Schooling in Students of Chinese Ethnicity in Singapore and Sydney [online]. *Arch Ophthalmol.*126(4):527-530. [online]. Available at http://synapse.princeton.edu/~sam/myopia_lifestyle_schooling_Rose.pdf. [Accessed: 13th April, 2013].

[56] Sapkota, Y.D., Adhikari, B.N., Pokharel, G.P., Poudyal, B.K. and Ellwein, L.B., (2008). The Prevalence of Visual Impairment in School Children of Upper-Middle Socioeconomic Status in Kathmandu. *Ophthalmic Epidemiology*, 15:17–23.

[57] Saltarelli, D., Wildsoet, C., Nickla, D., Trioli, D., (2004). Susceptibility to Form- Deprivation Myopia in Chicks is Not Altered by an Early Experience of Axial Myopia, *Optometry & Vision Science*, 81:119-126.

[58] Saw S.M., Carkeet A. and Chia K.S., (2002). Component dependent risk factors for ocular parameters in Singapore Chinese children. Ophthalmology,109:2065–71.

[59] Saw, S.M., Gazzard G., Shih-Yen E.C. and Chua W.H., (2005). Myopia and associated pathological complications. *Ophthalmic Physiol Opt*, 25: 381–391.

[60] Saw, S.M., Katz, J., Schein, O. D., Chew, S. J., and Chan, T. K., (1996). Epidemiology of myopia. *Epidemiologic Reviews*, 18:175-87.

[61] Tan, N.W.H., Saw, S.M., Lam, D.S,C., Cheng H.M., Rajan, U. and Chew, S.J., (2000). Temporal variations in myopia progression in Singaporean children within an academic year, *Optometry & Vision Science*, 77: 465-472.

[62] Tay, M. T. H., Au, K. G. and Eong, C. Y., (1992). Myopia and educational attainment in 421,116 young Singaporean males. *Annals of the Academy of Medicine Singapore* 21(6): 785-791.

[63] Trichtel F. and Zur E., (1998) and Therapy of Myopia, Enke, Stuttgart, p. 39

[64] Villarreal, G. M., Ohlsson, J. and Cavazos, H., (2003). Prevalence of Myopia among 12- to 13-Year-Old Schoolchildren in Northern Mexico. *Optometry and Vision Science* 80(5): 369-373.

[65] Walker, T.W. and Mutti, D.O., (2002). The effect of accommodation on ocualer shape. Optom Vis Sci.79(7):424-30.

[66] Whitmore, W.G., (1992) . Congenital and developmental myopia. 6:361-5.

[67] Wong, T.Y., Foster, P.J., Johnson, G. J. and Seah S.K.L., (2002). Education, socioeconomic status, and ocular dimensions in Chinese adults: the Tanjong Pagar Survey. *Br J Ophthalmol* ,86:963–968.

[68] Wu, H. M., Seet, B. and Yap, E. P. H., (2001). Does education explain ethnic differences in myopia prevalence? A population-based study of young adult males in Singapore. *Optometry and Vision Science* 78(4): 234-239.

[69] Yackle, K. and Fitzgerald, D.E., (1999) Emmetropization: an overview. *J Behav Optom* 10: 38-43.

[70] Yoo, R., Logani, S., Mahat, M., Wheeler, N. C., and Lee, D. A., (1999). Vision screening of abused and neglected children by the UCLA Mobile Eye Clinic. *Journal of the American Optometric Association*, 70:461-69.

[71] Zadnik, K., Manny, R.E., Yu, J.A., Mitchell, G.L., Cotter, S.A. and Quiralte, J.C., (2003). Ocular component data in schoolchildren as a function of age and gender. *Optom. Vis. Sci.* 80(3): 226-3.

[72] Zadnik K., (1995) The Glenn A. Fry Award Lecture;Myopia development in childhood. *Optom Vis Sci*, 74:603– 8.