

The Speed of Reading with Different Low Vision Devices in Emmetropic Subjects: Prospective Study

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Abstract

Purpose: To see the reading speed with different low vision devices having same magnification i.e. 2X in emmetropic subjects

Objective: To rule out any kind of device this may be of help in future for low vision patients via emmetropic subjects.

Material & Methods: The prospective study consists 200 emmetropic subjects of age ranging from 15 to 35 years. The all subject has been asked to read Hindi newspaper of same fonts under same room illumination, magnification and under a constant time period of 1 minute with 5 low vision devices (LVD). The LVD uses were 2x bar magnifier, 2x dome magnifier (55M), 2x dome magnifier (65M), 2x spectacle magnifier and 2x pocket magnifier.

Results: Among 200 emmetropic subjects, 126 were males and 74 were female. The mean age of 200 subjects was 22.91 ± 3.92 years. The mean number of letters read with 2x Bar Magnifier was 442.13 ± 165.316 , 2x Dome Magnifier (55M) was 440.4 ± 173.352 , 2x Spectacle Magnifier was 484.21 ± 486.316 , 2x Pocket Magnifier was 443.63 ± 170.374 , 2x Dome Magnifier (65M) was 450.98 ± 259.690 in one minute. When one device was compared with other four devices it was found that none of the device showed statistically significance.

Conclusion: None of the device was found to be statistically significant, so equally all the magnifiers can be useful and can be used as a startup for low vision patients.

Keywords: Low vision, Low vision devices, Emmetropes, Reading speed

Introduction

'Low vision', which to a large extent has evolved from the term 'subnormal vision'. This term is almost synonymous with visual impairment, with the added provision that the residual vision is usable. Those persons who are totally blind, having a visual acuity of no perception of light in

both eyes, make up less than 6% of the visually impaired population, and those with a visual acuity of perception of light only, a further 5%. Some 11% of visually impaired persons are therefore not included in the category of low vision patient. (Acosta, 2001)

According to WHO, Low vision is one who has impairment of visual functioning even after treatment and/or standard refractive correction, has visual acuity less than 6/18 or light perception, or a visual field less than 10 degrees from the point of fixation, but who uses, or is potentially able to use vision for the planning and/or execution of a task for which vision is essential. (WHO)

Prevalence of low vision according to study (Vijaya, 2014, p. 477) in Chennai was 0.85% (95% CI 0.6–1.1%) and was positively associated with age and illiteracy. Cataract was the leading cause (57.6%) and glaucoma was the second cause (16.7%) for blindness. The prevalence of low vision was 2.9% (95% CI 2.4–3.4%) and visual impairment (blindness + low vision) was 3.8% (95% CI 3.2–4.4%). The primary causes for low vision were refractive errors (68%) and cataract (22%). (Beaver, 1995, p. 913-21) It significantly impacts a person's quality of life and is a major socioeconomic problem for both individuals and the public, as there is increase in elderly population age related vision problems also increases and simultaneously the need of rehabilitation is also growing. (Scott, 1999, p. 54-62) Low vision is one of the main concern of today's date and the person suffering from low vision are facing too much problem in reading but in today's world reading is one of the main concern.

The purpose of giving rehabilitation or developing low vision aids or new trends for low vision person is to allow them to utilize there low vision and carrying there day to day activities among which reading is one of the main concern of today's world, only by providing some low vision aids or recent trends developed for low vision patients, could help them in reading.

The low vision aids range from optical to non-optical devices and also simple optical magnifiers to high magnification video magnifiers.² Basically for near, various low vision magnifiers could be used; all the devices have pros and cons in terms of field, working distance etc. (Altpeter, 2015, p. 1369-75) There are various types of low vision devices being used worldwide, a variety of helpful visual aids, including stand and hand-held magnifiers, strong magnifying reading glasses, loupes, and small telescopes. Because these devices can provide greatly increased magnification powers and prescription strengths, along with higher-quality optics (i.e., the way the lens bends or refracts light), they are different from regular glasses and magnifiers most often they require training to help you use them effectively. Non optical devices can include adaptations such as reading stands, supplemental lighting, absorptive (or glare control) sunglasses, typo-scopes, and tactile locator dots.

They can be used in combination with low vision optical devices and can help with reading, organizing, labeling, and a variety of everyday tasks. (Natarajan, 2013, p. 191) Electronic magnifying systems come in many different varieties and sizes, depending upon the task or activity you want, or need, to do. Some have a camera system that displays a magnified image on a monitor, which can be helpful for reading mail, books, and magazines, while others are hand-

held, portable, and can be taken to the supermarket to read labels and coupons, or to restaurants for reading menus. In this study, 5 low vision devices have been used mainly focusing on bar magnifier, Pocket magnifier, Dome magnifier, Spectacle magnifier.

Material & Methods

The study was prospective study, conducted in low vision clinic at tertiary eye hospital. The study has been reviewed and approved by institutional review board, and was conducted in compliance with Declaration of Helsinki.

Inclusion criteria:

All emmetropic subjects passed (10+2 qualifications) from UP board were included in the study and for reading all optical devices were included. Age group of the subjects was 15-35 years.

Exclusion criteria:

Any history of trauma or surgery was excluded along with non-optical devices and also non-graduates; Presbyopic age was not added as the study excludes any refractive changes.

Devices used in this study– 2x bar magnifier , 2x dome magnifier (55M), 2x spectacle magnifier , 2x pocket magnifier , 2x dome magnifier (65M)

Procedures performed – The emmetropes were first called in the low vision clinic Randomly, visual acuity examination was done by using Log MAR chart for distance and Hindi chart for near , if the visual acuity was 20/20 and N6, those subjects were included in the study. After taking Visual acuity for distance and near, Hindi newspaper was placed in a reading stand with an overhead reading lamp (OHRL) of 11 watt, and person were first asked to adjust properly and then one by one devices were given to them and they were asked to read in a constant time period 1 min, the time was recorded using a stopwatch and the number of letters read by them were calculated and put together.

Bar magnifier- are ideal for reading letters, books, newspapers and magazines. As the magnifiers enlarge a complete line at a time, they allow better reading flow. Available in up to 2x magnification, there are both standard bar magnifiers and also versions with integrated reading guides. Bar Magnifiers provide shadow-free viewing for reading over long periods of time. It is designed for reading computer print outs and other detailed work.

Pocket magnifier– is a multi-power LED lighted magnifier. This handheld Pocket Magnifier has three magnifying powers: 6x, 4.5 x and 2.5x. It features a crystal-clear acrylic lens. It is an ideal low vision aid; The Pocket Magnifier is also perfect for reading fine print. It is so compact that it can easily fit in a pocket or purse. Pocket Magnifiers come in two basic flavors, Handheld Illuminated Magnifiers with an LED light and Non-illuminated Handheld Magnifiers.

Spectacle magnifier– Spectacle magnifiers are worn instead of or in conjunction with normal glasses, and are used to provide either near or distance vision. As these magnifying spectacles

leave both hands free, they are great where you are performing other tasks, or will be using them for an extended period of time. Spectacle Magnifiers are one of many categories of vision aids available for use by the visually impaired. Offering clip-on systems, prismatic eyewear, novel eyewear and high-powered magnifying spectacles in a variety of designs and magnification powers.⁸

Dome magnifier– A dome magnifier is a dome-shaped magnifying device made of glass or acrylic plastic, used to enlarge words on a page or computer screen, They are Plano–convex lenses, the flat (planar) surface is placed on the object to be magnified, and the convex (dome) surface provides the enlargement.⁵ They usually provide between 1.8× and 6× magnification. Dome magnifiers are often used by the visually impaired, they are good for reading maps or basic text and their inherent 180° design naturally amplifies illumination from ambient side-light. They are suitable for people with tremors or impaired motor skills, because they are held in contact with the page during use

All analysis was performed using Statistical software IBM SPSS Statistics version 20. Continuous data were presented as Mean ± Standard Deviation (SD), independent t tests has also been used. Analysis of variance (ANOVA) was used to compare the group means. P < 0.05 was considered to be significant for all tests.

Results

The mean age of 200 subjects was 22.91 ± 3.92 years. Among 200 emmetropic subjects, 74 (37%) were females and 126 (63%) were males. Among 200 subjects 31 (24.50%) were optometrists, 80 (35.50%) were students, others 89 (40%).

Table 1: Shows the gender distribution

Total no. of subjects	200
Male	126 (63%)
Female	74 (37%)

Table 2: Shows the average no. of letters read with the different low vision devices

Magnifiers	N	Mean± SD (range)
2XBar magnifier	200	442.13±165.32 (110-1115)
2XDome magnifier (65M)	200	440.24±173.35 (32-1287)
2X Spectacle magnifier	200	484.21± 468.316 (111-6544)
2X Pocket magnifier	200	443.63±170.374 (97-1221)
2X Dome magnifier (55M)	200	450.98±177.403(95-1115)
Total	1000	452.24±259.690(32-6544)

[N= number of participants; SD= standard deviations]

The average no. of letters read with 2x bar magnifier shows mean 442.13 ± 165.316 , The 2x Dome Magnifier (50M) shows mean 440.4 ± 173.352 , The 2x Spectacle Magnifier shows mean 484.21 ± 486.316 ,The 2x Pocket Magnifier shows mean 443.63 ± 170.374 , The 2x Dome Magnifier (65M) shows mean 450.98 ± 259.690 (Table 2).

Table 3: Shows the no. of letters read with the different devices compared with the Male (N=126) and Female (N=74)

Variables	Gender	N	Average Mean	P-value
AGE	Female	74	21.64 ± 3.21	0.000
	Male	126	23.66 ± 4.12	
No. Letters read 2X BAR MAGNIFIER	Female	74	418.14 ± 141.38	0.116
	Male	126	456.22 ± 176.90	
No. Letters read 2X DOME MAGNIFIER(55M)	Female	74	411.81 ± 134.23	0.075
	Male	126	456.93 ± 191.21	
No. Letters read 2X SPECTACLE MAGNIFIER	Female	74	521.59 ± 728.35	0.388
	Male	126	462.25 ± 195.03	
No. Letters read 2X POCKET MAGNIFIER	Female	74	424.14 ± 130.84	0.216
	Male	126	455.07 ± 189.36	
No. Letters read 2X DOME MAGNIFIER 65M	Female	74	430.88 ± 148.66	0.220
	Male	126	462.78 ± 191.88	

[Here, the age has been compared with the gender along with the different devices using group statistics]

The no. of letters read with 2x Bar Magnifier by females (N=74) is 418.14 ± 141.38 , by males (N=126) 456.22 ± 176.90 , $p = 0.116$. The no. of letters read with 2x Dome Magnifier (55M) by females (N=74) is 411.81 ± 134.23 , by males (N=126) 456.93 ± 191.21 , $p = 0.075$. The no. of letters read with 2x Spectacle Magnifier by females (N=74) is 521.59 ± 728.35 by males (N=126) 462.25 ± 195.03 , $p = 0.388$. The no. of letters read with 2x Pocket Magnifier by females (N=74) is 424.14 ± 130.84 by males (N=126) 455.07 ± 189.36 , $p = 0.216$. The no. of letters read with 2x Dome magnifier (65M) by females (N=74) is 430.88 ± 148.66 by males (N=126) 462.78 ± 191.88 , $p = 0.220$.

Table 4: Shows the comparison of one device with other four devices

Variables		Mean Difference± SD	P- Value	95% Confidence Interval	
				Lower Bound	Upper Bound
2XB	2XD	1.895±25.969	1	-71.16	74.95
	2XSM	-42.080±25.969	1	-115.14	30.98
	2XPM	-1.495±25.969	1	-74.55	71.56
	2XDM	-8.845±25.969	1	-81.9	64.21
2XD	2XSM	-43.975±25.969	0.907	-117.03	29.08
	2XPM	-3.390±25.969	1	-76.45	69.67
	2XDM	-10.740±25.969	1	-83.8	62.32
2XSM	2XD	43.975±25.969	0.907	-29.08	117.03
	2XPM	40.585±25.969	1	-32.47	113.64
	2XDM	33.235±25.969	1	-39.82	106.29
2XPM	2XD	3.390±25.969	1	-69.67	76.45
	2XSM	-40.585±25.969	1	-113.64	32.47
	2XDM	-7.350±25.969	1	-80.41	65.71
2XDM	2XD	10.740±25.969	1	-62.32	83.8
	2XSM	-33.235±25.969	1	-106.29	39.82
	2XPM	7.350±25.969	1	-65.71	80.41

[Multiple comparisons with analysis of variance tests has been used for comparisons of one device with other devices]

The average no. of letters read with 2x bar magnifier has been compared with the different devices P value, confidence interval has been derived, firstly it has been compared with, no. of letters read with 2x dome magnifier (55M) which gave the mean difference 1.895 ±25.969 which show no statistical significant, (p value 1.0),

Secondly it has been compared with the no. of letters read with spectacle magnifier which gave the mean of -42.080 ± 25.969 (p value 1.00),

Thirdly it has been compared with 2x Pocket Magnifier where the mean difference was -1.495 ± 25.969 (p value 1.00),

Fourthly, it has been compared with 2 x dome magnifier (65M) where the mean difference was - 8.845 ± 25.969 (p value 1.00)

The no. of letters read with 2x Dome magnifier (55M) has been compared with the different devices and the mean, P value; confidence interval has been derived, firstly it has been compared

with, no. of letters read with 2x Spectacle magnifier which gave the mean difference -43.975 ± 25.969 , (p value .907),

Secondly, it has been compared with the no. of letters read with 2x pocket magnifier which gave the mean of -3.390 ± 25.969 (p value 1.00)

Thirdly, it has been compared with 2x Dome Magnifier (65M) where the mean difference was -10.740 ± 25.969 (p value 1.00)

The no. of letters read with 2x spectacle magnifier has been compared with the different devices and the mean, P value; confidence interval has been derived, firstly it has been compared with, no. of letters read with 2x bar magnifier which gave the mean difference 42.080 ± 25.969 , (p value 1.0),

Secondly, it has been compared with 2x Pocket Magnifier where the mean difference was 40.585 ± 25.969 (p value 1.00),

Thirdly, it has been compared with 2x dome magnifier (65M) where the mean difference was -33.235 ± 25.969 (p value 1.00)

The no. of letters read with 2x pocket magnifier has been compared with the different devices and the mean, P value; confidence interval has been derived, firstly it has been compared with, no. of letters read with 2x Dome magnifier (65M) which gave the mean difference -7.350 ± 25.969 (p value 1.0).

Table 5: According to the age group (15-20years) N= 62, the devices has been compared, using descriptive statistics

Magnifiers	N	Mean \pm Std. deviation
No. letters read 2X BAR MAGNIFIER	62	416.63 \pm 152.530
No. Letters read 2X DOME MAGNIFIER(55M)	62	408.53 \pm 154.287
No .letters read 2X SPECTACLE MA GNIFIER	62	423.76 \pm 144.972
No .letters read 2X POCKET MAGNIFIER	62	416.76 \pm 157.945
No. letters read 2X DOME MAGNIFIER 65M	62	446.95 \pm 157.945

The age has been divided to different age groups and it has been seen that, among 15-20 years of age the no. of subjects are 62.

The no. of letters read with 2x Bar magnifier, it gives the mean of 416.63 with standard deviation 152.530

The no. of letters read with 2x Dome magnifier (55M), it gives the mean of 408.53 with standard deviation 154.287

The no. of letters read with 2x Spectacle magnifier, it gives the mean of 423.76 with standard deviation 144.972

The no. of letters read with 2x Pocket magnifier, it gives the mean of 416.76 with standard deviation 157.945

The no. of letters read with 2x Dome magnifier (65M), it gives the mean of 446.95 with standard deviation 157.945

Table 6: According to the age group (21-25years) N= 85, the devices has been compared, using descriptive statistics

Magnifiers	N	Mean ± Std. deviation
No. letters read 2X BAR MAGNIFIER	85	440.80 ± 152.433
No. Letters read 2X DOME MAGNIFIER(55M)	85	441.71±157.118
No .letters read 2X SPECTACLE MA GNIFIER	85	526.54±682.246
No .letters read 2X POCKET MAGNIFIER	85	445.71±162.559
No. letters read 2X DOME MAGNIFIER 65M	85	429.75±159.645

The age has been divided to different age groups and it has been seen that, among 21-25 years of age the no. of subjects are 85.

The no. of letters read with 2x Bar magnifier, it gives the mean of 440.80 with standard deviation 152.433

The no. of letters read with 2x Dome magnifier (55M), it gives the mean of 441.71 with standard deviation 157.118

The no. of letters read with 2x Spectacle magnifier, it gives the mean of 526.54 with standard deviation 682.246

The no. of letters read with 2x Pocket magnifier, it gives the mean of 445.71 with standard deviation 162.559

The no. of letters read with 2x Dome magnifier (65M), it gives the mean of 429.75 with standard deviation 159.645.

Table 7: According to the age group (26-30years) N= 47, the devices has been compared, using descriptive statistics

Magnifiers	N	Mean ± Std. deviation
No. letters read 2X BAR MAGNIFIER	47	476.23 ±192.939
No. Letters read 2X DOME MAGNIFIER(55M)	47	476.47±225.63
No .letters read 2X SPECTACLE MA GNIFIER	47	490.38± 239.719
No .letters read 2X POCKET MAGNIFIER	47	473.13 ± 211.395
No. letters read 2X DOME MAGNIFIER 65M	47	489.79 ±223.136

The age has been divided to different age groups and it has been seen that, among 26-30 years of age the no. of subjects are 47-

The no. of letters read with 2x Bar magnifier, it gives the mean of 476.23 with standard deviation 192.939

The no. of letters read with 2x Dome magnifier (55M), it gives the mean of 476.47 with standard deviation 225.637

The no. of letters read with 2x Spectacle magnifier, it gives the mean of 490.38 with standard deviation 239.719

The no. of letters read with 2x pocket magnifier, it gives the mean of 473.13 with standard deviation 211.395

The no. of letters read with 2x Dome magnifier (65M), it gives the mean of 489.79 with standard deviation 223.136

Table 8: According to the age group (31-35years) N= 6, the devices has been compared, using descriptive statistics

Magnifiers	N	Mean ± Std. deviation
No. letters read 2X BAR MAGNIFIER	6	457.33 ± 162.517
No. Letters read 2X DOME MAGNIFIER(55M)	6	463.17± 60.011
No .letters read 2X SPECTACLE MA GNIFIER	6	460.83 ±115.312
No .letters read 2X POCKET MAGNIFIER	6	460.67 ±162.019
No. letters read 2X DOME MAGNIFIER 65M	6	489.17 ± 195.509

The age has been divided to different age groups and it has been seen that, among 31-35 years of age the no. of subjects are 6

The no. of letters read with 2x Bar magnifier, it gives the mean of 457.33 with standard deviation 162.517

The no. of letters read with 2x Dome magnifier (55M), it gives the mean of 463.17 with standard deviation 60.011

The no. of letters read with 2x Spectacle magnifier, it gives the mean of 460.83 with standard deviation 115.312

The no. of letters read with 2x pocket magnifier, it gives the mean of 460.67 with standard deviation 162.019

The no. of letters read with 2x Dome magnifier (65M), it gives the mean of 489.17 with standard deviation 195.509

Table 9: Shows the no. of subjects in the age group

Age group	Frequency
15-20	62
21-25	85
26-30	47
31-35	6

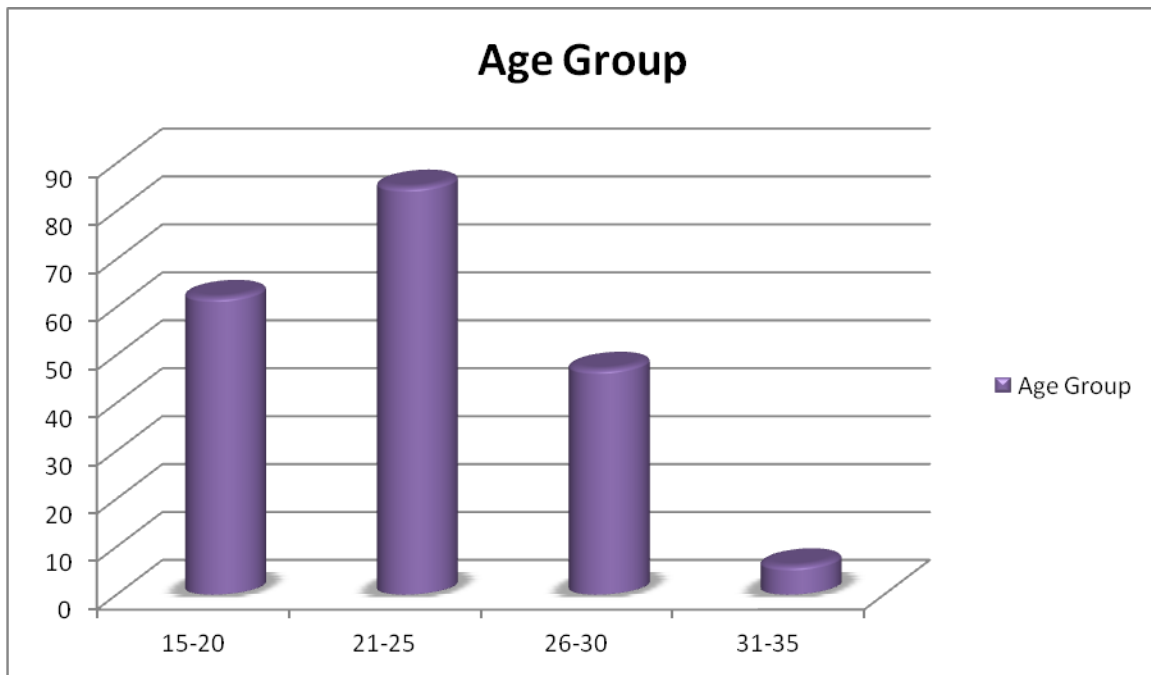


Fig 3: Shows age group distribution

Table 10: According to age group, the devices has been compared and mean and standard deviation

Dependent Variable	Age group		Mean Difference	P-Value		
				Lower bound	Upper bound	
No. letters read 2X BAR MAGNIFIER	15 to 20	21 to 25	-24.17±27.573	1.000	49.32	
		26 to 30	-59.61±31.930	.381	25.50	
		31 to 35	-40.70±70.584	1.000	147.42	
	21 to 25	26 to 30	-35.43±30.009	1.000	44.55	
		31 to 35	-16.53±69.737	1.000	169.34	
		26 to 30	21 to 25	35.43±30.009	1.000	115.42
	26 to 30	31 to 35	18.90±71.571	1.000	209.66	
		15 to 20	21 to 25	-33.17±28.861	1.000	43.75
			26 to 30	-67.94±33.421	.261	21.14
	31 to 35		-54.63±73.882	1.000	142.28	
	No. Letters read 2X DOME MAGNIFIER(55M)	21 to 25	26 to 30	-34.76±31.411	1.000	48.96
			31 to 35	-21.46±72.994	1.000	173.09
26 to 30			21 to 25	34.76±31.411	1.000	118.48
26 to 30		31 to 35	13.30±74.915	1.000	212.97	
		15 to 20	21 to 25	-102.78±78.464	1.000	106.35
			26 to 30	-66.62±90.863	1.000	175.55
31 to 35			-37.08±200.864	1.000	498.29	
No. letters read 2X SPECTACLE MAGNIFIER		21 to 25	26 to 30	36.16±85.398	1.000	263.77
			31 to 35	65.71±198.451	1.000	594.64
			26 to 30	21 to 25	-36.16±85.398	1.000
		26 to 30	31 to 35	29.55±203.672	1.000	572.40
			15 to 20	21 to 25	-28.95±28.453	1.000
	26 to 30			-56.37±32.949	.532	31.45
21 to 25	31 to 35	-43.91±72.838		1.000	150.23	
	21 to 25	26 to 30	-27.42±30.967	1.000	55.12	
		31 to 35	-14.96±71.964	1.000	176.84	
26 to 30						

		21 to 25	27.42±30.967	1.000	109.96
		31 to 35	12.46±73.857	1.000	209.31
No. letters read 2X DOME	15 to 20	21 to 25	17.20±29.570	1.000	96.01
MAGNIFIER 65M		26 to 30	-42.84±34.243	1.000	48.43
		31 to 35	-42.22±75.698	1.000	159.54
	21 to 25				
		26 to 30	-60.03±32.183	.382	25.74
		31 to 35	-59.41±74.789	1.000	139.92
	26 to 30				
		21 to 25	60.03±32.183	.382	145.81
		31 to 35	.62±76.756	1.000	205.20

Discussion

This study investigated a starting point for low vision patient who are more engrossed for near work. Several studies have showed that it was done on low vision (Legge, 2016, p. 102 & Cohen, 1991, p. 95-97), and have compared with electronic devices but this study electronic device has been excluded. The devices used for low vision purpose are very much useful for them as without it there life is nothing, low vision patient need to depend on other people for their day to day work and for living there life smoothly, research has been so much useful for them that rehabilitation and also invention of such low vision devices (magnifiers, telescopes), electronic devices, non-optical devices has made there life run easily and smoothly and also carrying out there life independently. (Hasan Minto, 2020)

This study has solely focused on emmetropic subjects not on low vision subjects because a control group has not been used , this study has focused on the use of low vision devices in future by focusing on the emmetropic subjects by taking a different concept , like if anything has been made it has been tried by normal person like the example of wheel chair, used in physically handicapped person if wheel chair is made it is first used by a normal person because then only we can decide whether it is good for physically handicapped person or not , if normal person can use it properly then definitely it will be good for physically handicapped person , by keeping this in mind , the speed of reading has been assessed in emmetropic subjects with the help of low vision devices so that it will give an idea that which device will be better for low vision subjects who are more engrossed for their near work and reading (Van Rens, 1991, p. 205-10), there are so many profession like lawyers , teachers , writers , authors , professors , who need more of near work in there whole day , but if due to any circumstance they fall under the category of low vision this will help them in their future to easily carry out their life independently and to earn their livelihood and not to depend on any other person.

Also in other study (Watson, 1997, p. 260-65), it was assessed the effects of reading aids for adults with low vision, in that they have assessed that it was necessary to understand the characteristics of subjects to assess the suitability of devices on subjects to see the effects of reading performance, they have used electronic devices but in this study electronic devices has been excluded. In one of the previous study it showed that spectacles were very much useful in

this study and also telescopes used because they have mainly focused on distance vision and also in geriatric population but in this study geriatric population as well telescopes both has been kept in exclusion criteria.

So it has been seen that different authors have interpreted differently in regarding to their studies, some said reading is better with more contrast and magnifications some said that in geriatric population spectacles and telescopes has been useful, but in this study basically focusing on magnifiers it has been seen that we can recommend them for low vision patients, we can think of a start up from it.

All the devices has different diameter so it can influence the reading speed and only emmetropic subjects has been used so it is tough to decide which one will be a better option for low vision subjects.

Limitations

All the devices has different diameter so it can influence the reading speed and only emmetropic subjects has been used so it is tough to decide which one will be a better option for low vision subjects, anecdotal nature of data, different devices varies according to the mean as well as standard deviation.

Another limitation of this study is that it is not done in low vision patients and electronic devices has been excluded.

Conclusion & Future Scope

None of the device was found to be statistically significant, so equally all magnifiers could be useful and can be used as a startup for low vision subjects coming in the category of low vision. In future, similar study can be done by taking a control group, by comparing the mean number of letters read with emmetropic subjects and with low vision subjects. By comparing them we can get a better result and also an idea of better magnifier to be used further in low vision subjects.

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