

## Original Article

# Use of Readymade Spectacles to Meet Visual Needs in A Low-Income Population

## A Authors

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**Purpose:** To evaluate the usefulness of less expensive readymade (RM) spectacles to correct presbyopia, near and distance refractive errors.

**Method:** This was a cross-sectional study involving the use of a questionnaire to evaluate the use of readymade spectacles to meet visual needs in low-income populations. Patients were given vision contentment questionnaires before their examination and after dispensing of ready-made spectacles. A sample size of a total of 61 visually impaired patients was asked to fill the questionnaire. This study was conducted in October-December 2017.

**Results:** Patients were asked to rate their satisfaction with their distance and near vision on a scale of 1 to 4 (1, poor; 4, excellent). After dispensing the spectacles 60.7% reported excellent and 39.3% reported a good level of satisfaction with near vision ( $p=0.000$ ). 47.5% people reported good level while 49.2% reported excellent level of satisfaction with distance vision ( $p=0.000$ ). Self-rating of difficulty of performance of visual tasks was significantly different ( $p = 0.000$ ) when comparing near tasks with presenting near correction versus with new RM spectacles. After dispensing the readymade spectacles the percentage of patients able to get N6 VA increased from 44.3% to 72.1% at near (significantly increased  $p= 0.000$  with the RM readymade spectacles). The percentage of patients able to see 6/6 at distance was also significantly increased With the RM spectacles ( $p = 0.000$ ).

**Conclusion:** Ready-made spectacles can be an appropriate and lower-priced alternative for many sufferers with presbyopia, hyperopia and mild to moderate myopia where the approach to custom made spectacles is not easy.

**Keywords:** Visual acuity, readymade spectacles, custom made

## Introduction:

Readymade spectacles are those spectacles in which only spherical correction is present. It also contains the same refractive correction for both eyes and these spectacles are straight-forward to dispense. The readymade spectacles can be produced in high volume with the best quality at tremendously low cost.<sup>1</sup>

The chief source of visual impairment is uncorrected refractive error and it is concluded that 670 million humans all over are suffering from vision impairment because of lack of glasses. 153 million people are not having distance correction and 517 million people have no correction for near. Presbyopia which is not corrected is amongst 410 million persons who are suffering from visual impairment. Countries that are not developed properly occupy 94% of these criteria. This is assumed that, if the approach to the glasses remains inadequate for needy, growth will be up to 563 million of those who are suffering from presbyopia which is not corrected by 2020.<sup>2,3</sup>

Globally it is estimated that 13 million teenagers are suffering from visual impairment just because of no correction for their refractive errors.<sup>4</sup> So vision impairment is commonly caused by refractive errors which are not corrected especially in kids and myopia is the most common type amongst all. 9 years of age is the stage of the normal evolution of myopia and it goes on according to the development. Younger kids are influenced mostly with hyperopia, and all other age groups are influenced by astigmatism. Unification of myopia and astigmatism is present among many children. For the correction of refractive errors, measurement and appropriation of type and stage of error and prescription of corrective lenses are given inside the customized frame.

At the same time as uncorrected refractive error can be corrected by the usage of spectacles, there are several obstacles which limit the uptake of services.<sup>5,6</sup>

Other treatment options for correcting refractive errors other than spectacles are contact lenses and refractive surgery. Even though the growing reputation of other alternative treatment options, spectacles nonetheless remained the finest effective method for the treatment of uncorrected refractive errors.<sup>7</sup>

The worldwide economic load of refractive error which is not corrected at distance has been estimated at \$202 billion in yield losses while correcting the problem has been predicted at about US\$20 billion.<sup>8,9</sup>

Many benevolent organizations have been involved in the usage of recycled spectacles to deliver glasses to low-income persons in unindustrialized countries. The IAPB (International Agency for the prevention of Blindness) has in recent times forwarded a role paper on recycled spectacles in the nation that, even though the objectives are precise but

there should be the prevention of the usage of recycled glasses. The IABP also concluded that recycled glasses are not overpriced, that everybody no matter his economic instances take proper to cozy perfect visualization, and so on everybody must have glasses that are appearance appealing & in shape without problems.<sup>10</sup>

The cost of refractive error correction is in part driven with the aid of the reality that custom glasses are reserved with the power of sphere and cylinder in each eye with high precision, and often can't be distributed at the time of prescription. Readymade spectacles are produced in great amounts using the same power of sphere in eyes, in restricted diopter stages and designs of frames. Readymade glasses are distributed straight away. It is assumed that most of the people are having appropriate visual acuity with readymade spectacles.<sup>11,12,13</sup>

There are many hurdles in the method to correct the refractive error but the basic two are the price of spectacles and access to eye care professionals. In most of the unindustrialized countries, a maximum of medical officers stays inside the inner-city regions. Individuals who stay in countryside states are required to travel to urban regions to receive care and this adds to the values of spectacles.<sup>14</sup> When custom made spectacles are unavailable then readymade ones are used as refractive correction in developing countries. Readymade glasses are mass manufactured in pre-determined powers with same spherical correction in both eyes and are available globally from the wholesalers in China. These can be bought in most areas for as little as US\$0.45.<sup>15</sup>

## Materials and Methods:

This was a cross-sectional study involving the use of a questionnaire to evaluate the use of readymade spectacles to meet visual needs in a low-income population. Patients were given vision contentment questionnaires before their examination and after dispensing of ready-made spectacles. A total of 61 visually impaired patients were asked to get the questionnaire filled. This study was conducted in October-December 2017. All data were entered and analyzed using Statistical Package for Social Science (SPSS Version 22.00).

## Results:

**Table 1:** Near & Distance Tasks

		Paired Differences				t	Sig. (2-tailed)	
		Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference			
					Lower			Upper
Pair 1	Difficulty in recognizing faces - difficulty in recognizing faces after using spectacle	-2.80328	2.27171	.29086	-3.38509	-2.22147	-9.638	.000
Pair 2	difficulty in reading tiny font prints - difficulty while reading tiny fonts after using spectacles	-3.21311	2.19935	.28160	-3.77640	-2.64983	-11.410	.000
Pair 3	difficulty in reading signs across the road - difficulty in seeing signboards after using spectacles	-2.09836	2.58654	.33117	-2.76080	-1.43592	-6.336	.000
Pair 4	difficulty in seeing mobile numbers - difficulty in seeing mobile numbers after using spectacles	-2.49180	2.80252	.35883	-3.20956	-1.77405	-6.944	.000

$P=0.000$  value shows that results are significant. This concludes that people reported marked difference while doing near and distant tasks before and after using the ready-made spectacles.

**Table 2:** Level of satisfaction

		Paired Differences					t	Sig. (2-tailed)
		Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference			
					Lower	Upper		
Pair 1	level of satisfaction with distance vision - the level of satisfaction in distance vision after using spec	-1.85246	.99726	.12769	-2.10787	-1.59705	-14.508	.000
Pair 2	level of satisfaction with a near vision - the level of satisfaction in near vision after using spec	-.83607	.95185	.12187	-1.07984	-.59229	-6.860	.000

$P=0.000$  value shows that results are significant. This concludes that people were highly satisfied with distant and near vision after using the ready-made spectacles.

**Table 3:** Visual acuity

		Paired Differences					t	Sig. (2-tailed)
		Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference			
					Lower	Upper		
Pair 1	level of satisfaction with distance vision - the level of satisfaction in distance vision after using spec	-1.85246	.99726	.12769	-2.10787	-1.59705	-14.508	.000
Pair 2	level of satisfaction with a near vision - the level of satisfaction in near vision after using spec	-.83607	.95185	.12187	-1.07984	-.59229	-6.860	.000

$P=0.000$  value that shows there is significant difference between visual acuity for distant and near vision after using ready-made spectacles.

## Discussion:

Readymade spectacles are those spectacles in which only spherical correction is present. It also contains the same refractive correction for both eyes and these spectacles are straightforward to dispense. Visual impairment is described as VA  $\leq 20/60$  with the first-rate optical correction or severe central area loss. It's also called distance VA of 20/50 or poor in precise viewing eye. Vision is an essential hint of health and quality of life. The chief source of visual impairment is uncorrected refractive error and its miles envisioned that 670 million humans all-inclusive are suffering from vision impairment because of lack of glasses. 153 million people are not having distance correction and 517 million people have no correction for near. Presbyopia which is not corrected is amongst 410 million persons who are suffering from visual impairment. This is assumed that, if the approach to the glasses remains inadequate for needy, growth will be up to 563 million of those who are suffering

from presbyopia which is not corrected by 2020.

Vision screening to more than 44000 persons in Timor-Leste and since 2006 more than thirty-six thousand glasses were distributed by FNTL the NGO. This study evaluates that ready-made spectacles can be an appropriate and lower-priced alternative for many myopes, hyperopes, and presbyopes where the approach to custommade glasses is not easy.

Hookway noted in 2010 that readymade bifocals were superbly all around acknowledged, bifocals user satisfied from 6.6 to 89.4% at a near distance and for the distant distance it is 11 to 89.4%. The proportion of people having visual acuity of 20/40 or better than this is improved ranging from 44 to 97% at a near distance and ranging from 60 to 84.5% at a distant distance. With RM readers functionally good near vision improved from 38 to 97%. By complete satisfaction, vision at near is much improved from 6.3 to 86.6%.

This study has different results as compared to that because patients included in this study have age  $\geq 14$  years while the above-mentioned study included only the adult population. Moreover, our study sample size is relatively small with less study period. After dispensing the readymade spectacles the percentage of patients able to get N6 VA increased from 44.3% to 72.1% at near (significantly increased  $p=0.00$  with the RM readymade spectacles). The percentage of patients able to see 6/6 at distance was also significantly increased With the RM spectacles ( $p=0.00$ ).

Shane in 2012 concluded that uncorrected visible acuity in single eye enhanced a mean of 4.5 lines by correction of quality, 3.5 lines by ready-made spectacles and 4.0 lines by used glasses. The glasses under use are representing a numerically significant benefit over readymade glasses where  $p$  is less than 0.001. The average visual acuity is changed to 20/25 from 20/60 by using all types of spectacles in the better eye.

Our study includes a total of 61 patients and results are also different from the above study. Out of 61 patients, 57(93.4%) patients found spectacles very helpful. After dispensing the readymade spectacles the percentage of patients able to get N6 VA increased from 44.3% to 72.1% at near (significantly increased  $p=0.000$  with the RM readymade spectacles). The percentage of patients able to see 6/6 at distance was also significantly increased With the RM spectacles ( $p=0.000$ ). A study which was done on the Chinese school children to check the utility of readymade spectacles. The study revealed a difference of 15% in glasses wear was alike in two groups (forty-seven percent in readymade glasses group and fifty-two percent in custom glasses group). While in this study after dispensing the readymade spectacles the percentage of patients able to get N6 VA increased from 44.3% to 72.1% at near (significantly



increased  $p = 0.000$  with the RM readymade spectacles). The percentage of patients able to see 6/6 at distance was also significantly increased With the RM spectacles ( $p = 0.00$ ). Self-rating of difficulty of performance of visual tasks was significantly different ( $p = 0.000$ ) for both distance tasks.

### Conclusion:

Ready-made spectacles can be an appropriate and lower-priced alternative for many sufferers with presbyopia, hyperopia and mild and moderate myopia where the approach to custom made spectacles is not easy.

### References:

- Morjaria P, Murali K, Evans J, Gilbert C. Spectacle wearing in children randomized to ready-made or custom spectacles, and potential cost savings to the programs study protocol for a randomized controlled trial. *TRIALS*. 2016; 17(1):36.
- Holden BA, Fricke TR, Ho SM, Wong R, Schlenker G, Cronjé, et al. Global vision impairment due to uncorrected presbyopia. *Arch Ophthalmol*. 2008; 126(1):1731–9.
- Resnikoff S, Pascolini D, Mariotti SP, Pokharel GP. Global magnitude of visual impairment caused by uncorrected refractive errors in 2004. *Bull World Health Organ*. 2008;86(1):63-70.
- Sharma A, Congdon N, Patel M, Gilbert C. School-based approaches to the correction of refractive error in children. *Surv Ophthalmol*. 2012; 57(3):272–83.
- Marmamula S, Khanna RC, Shekhar K, Rao GN. A population-based cross-sectional study of barriers to uptake of eye care services in South India: The Rapid Assessment of Visual Impairment (RAVI) project. *BMJ Open*. 2014; 4(1):5125.
- Marmamula S, Keeffe JE, Raman U, Rao GN. A population-based cross-sectional study of barriers to utilization of refraction services in South India: Rapid Assessment of Refractive Errors (RARE) Study. *BMJ Open*. 2011;1:172.
- Castanon Holguin AM, Congdon N, Patel N, Ratcliffe A, Esteso P, Toledo FS, et al. Factors associated with spectacle-wear compliance in school-aged Mexican children. *Invest Ophthalmol Vis Sci*. 2006;47(3):925-8.
- Smith TS, Frick KD, Holden BA, Fricke TR, Naidoo KS. Potential lost productivity resulting from the global burden of uncorrected refractive error. *Bull World Health Organ*. 2009;87(1):431–7.
- Fricke T. Global cost of correcting vision impairment from uncorrected refractive error. *Bulletin of the World Health Organization*. 2012; 90(1):728-38. 6.
- Pearce MG. Volunteer-based vision nongovernmental organizations and VISION 2020. *Optometry* 2008;79:464–471.
- Maini R, Keeffe J, Weih LA, McCarty CA, Taylor HR. Correction of refractive error in the Victorian population: the feasibility of "off the shelf" spectacles. *Br J Ophthalmol*. 2001;85(1):1283-6.
- du Toit R, Ramke J, Brian G. Tolerance to prism induced by readymade spectacles: setting and using a standard. *Optom Vis Sci*. 2007;84(1):1053-9.
- Bourne RR, Dineen BP, Huq DM, Ali SM, Johnson GJ. Correction of refractive error in the adult population of Bangladesh: meeting the unmet need. *Invest Ophthalmol Vis Sci*. 2004(1);45:410-7.
- Silva JC, Bateman JB, Contreras F. Eye disease and care in Latin America and the Caribbean. *Surv Ophthalmol*. 2002; 47(1):267–74.
- Ramke J, Brian G. Are readymade spectacles sufficient in developing countries? *Clin Experiment Ophthalmol* 2009; 3(1):900–2.

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