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A SYSTEMATIC REVIEW ON PHARMACEUTICAL PICTOGRAMS

DAI O AND JOSHI Y*

Department of Pharmacy Practice, School of Pharmaceutical Sciences, Shri Guru Ram Rai University, Dehradun-248001, Uttarakhand (India)

***Corresponding Author: Yogesh Joshi: E Mail: vogeshjoshi1583@rediffmail.com**

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ABSTRACT

Poorly understood and low retention of verbal form of medication information by the patients could lead poor health outcomes and non-adherence. Hence, using pictograms in a combination with writing and simple explanation may greatly improve the patients' understanding regarding their prescribed medication and enhanced compliance. This systematic review was conducted to examine potential interpretation and understanding of pharmaceutical pictograms by participants. A search of articles was conducted using several key terms on various databases, followed by manual sorting of the references of those articles that included. The research identified 39 studies, after screening only 13 studies that fulfilled the criteria were selected. This study showed that some existing pictograms were difficult to interpret but prior explanation could increase the understanding of these pictograms. However, before implementing in practice, further development and evaluation of study design with required intervention needed compulsorily.

Keywords: Pictograms, compliance, interpretation, explanation, articles

INTRODUCTION

Health literacy is required to comprehend basic health information and services. The capability of an individual based on health literacy is required to make appropriate health decisions. Those with low health literacy are elderly of over 65 years, belong to minority groups, are immigrants or refugees, may have a low socioeconomic status, have a low educational level, or are non-native speakers **[1]**. People with low health literacy have a poorer health status, less knowledge about their disease and its

treatment; fewer appropriate self-management skills, increased hospitalizations, increased health costs and poorer adherence rates **[2, 3]**. Thus, the challenge facing by the health care provider is to communicate effectively to educate them about their drug therapies in an appropriate, understandable form appropriate with the patients' literacy skills and furthermore to ensure that it is conventional in terms of patient's culture, beliefs, attitudes and expectations **[4-6]**. The use of stylized figurative drawing i.e. pictograms can help in making medication information more understandable and recall if used appropriately which can even result in better health outcome **[7]**.

Pictograms are the graphical representation to convey variable instructions on objects or actions and considered to be a part of international language and can be easily recognized with their intended meaning with little or no dependence on any particular culture or language **[8]**. The United States Pharmacopoeia (USP) convention defined pharmaceutical pictograms as "standardized graphic images that easily convey some medication instructions precautions and warnings to patients and their relatives" **[9]**. They have been designed to aid passing on essential information to all patients, including those for whom English is second language, who are visually impaired, low literacy and also for the literate persons which can serve as one of the easiest, the most significant means of providing information to patients that improving both understanding and adherence. They may improve warning comprehension and can sometimes be recognized and remembered far better than words. The success of pictogram as a communication aid rests on its design and testing process in order to produce acceptable pictogram, and their proper use by healthcare professional who must use pictogram in combination with oral and text containing information **[10, 11]**.

The design and evaluation of pictograms is a complex and multistage process. To find out the target population and to involve that population in all stages of the design; evaluation process is one of the main approaches to minimize problems when designing pictograms. The pictograms should primarily be tested among healthy respondents from the selected population and the successful designs should be tested in practice in a patient population to monitor for the effect of pictograms on the understanding of instructions and on compliance for drug therapy. In determining on the acceptability of a pictogram, researchers need to be guided by international standards which have been well-known for evaluating the comprehensibility of pictorial symbols. The American National Standards Institute

(ANSI Z535.3) and the International Standards Organization's (ISO 3864) & (ISO 1986) advise that, in a comprehension test, pictorial symbols must reach at least a criterion of 85% or 67% or 66% correct, respectively. These standards may be considered arbitrary, but given the importance of understanding the correct medication instructions in order to use a medicine safely, comprehension should be above the 85% level if possible **[12]**.

Search Strategy

This was a systematic literature review where the relevant articles were initially started searching by using the following terms: pharmaceutical pictogram or pictograph or pictorial or graphics or visual or symbol and evaluation of pictogram, followed by manual searches of the references in those articles that had inclusion criteria and purposes that were related to those of this review. To be included, these studies must be published in English language, published year should not be older than year 1995; complete articles available in databases; heterogeneous regarding study setting, study design, the number of participants, study population; and studies included must use general pharmaceutical pictograms to assess their transparency or understanding among participant rather than for patient's medication education. Reviews and letter to the editor were excluded from this study.

Data Extraction

Initially, 30 articles were obtained through web-based search, followed by additional 9 articles by way of manual search in the reference of those articles, for a total of 39. After screening the 39 articles based on inclusion criteria, 26 articles were excluded because they were editorial or duplicate or review or presented only abstracts, were not publish in English or simply they did not meet the inclusion criteria.

Analysis

The web-based search and the manual search yielded a final total of 13 articles that met the inclusion criteria, were published from 1995 to 2018. The studies' sample sizes vary from 45 to 385, and the participants' age ranges from ≥ 18 to 96 years. The participants' ethnicities were diverse: Latino, African American, Persian, and Asian. The general characteristic of the final 13 articles included in this review were summarized in the tabulated form **(Table 1)**.

Table 1: General Characteristics of Studies (n=13) in Systematic Review

Corresponding Author with Year	Study Setting, Country	Study Design	Study Population Characteristics	Number & Types of Pictograms	Duration of the Study	Outcomes
Merks P *et al.* 2018 [13]	Community pharmacy, Poland	Pilot study	N=68 Elderly patient's ≥65 years	Local pictogram =22	NR	All pictograms obtained an acceptable transparency level ≥ 66% & passed the short-term recall test.
Kanji L *et al.*2018 [14]	Hindu community, Portugal	Cross-sectional study	N= 50 Hindu individuals >18 years	USP-DI=15 FIP=15	6 months	The USP pictograms were better interpreted than FIP pictogram.
Mohamed LMA *et al.*2018 [15]	Out-patients, Khartoum North, Sudan	Cross-sectional, observational, questionnaire based study	N = 385 Sudanese patients ≥18 years	Sudanese labelled pictograms = 26	2 months & 5 days	Participants' level of correct interpretation of pictograms was 82.76%.
Zargarzadeh AH *et al.* 2017 [16]	Community, Iran	Cross-sectional study	N=358 Farsi speakers	Study-1 USP-DI=3 Study-2 USP-DI=3	6 months 11 months	Improvement in initial understanding of all three pictograms Improvement in understanding in the follow-up stage of all three pictograms
Barros IMC *et al.* 2014 [17]	Institutions, Brazil	Cross-sectional observational & interview study	N= 166 Elderly Brazilians	USP-DI=15	5 months	Maximum of the pictograms were not understand by the participants.
Sharif SI *et al.* 2014 [18]	University of Sharjah, United Arab Emirates	Cross-sectional study	N=300 Pharmacy and Non-Pharmacy students	USP-DI=28	3 months	only 2 pictograms were understand by students.
Joshi Y *et al.* 2011 [11]	Outpatients, Dehradun, India	Pre-post interventional study	N =200 Illiterate patients	USP-DI=10	NR	In pre-interventional phase - 1% patients interpreted the meaning of pictograms. After explanation - improvement in patients' interpretation for pictograms.
Knapp P *et al.* 2005 [19]	Primary Care Practice, England	Part-1 Cross-sectional study Part- 2 Randomized controlled design	N =160 Adults Age 17-83 years N =67 Older adults Age 65-96 years	20 pictogram (10 USP & 10 South African pictogram) 10 small or large USP pictograms	NR	Interpretation rates ranges from 7.5–90%. Pictograms are better understood if they were larger.
Dowse R *et al.* 2004 [20]	Mixed community, South Africa	NR	N =304 South African language groups	46 pictograms (23 USP-DI & 23 Local pictograms)	NR	Interpretation of USP pictograms 14% to 97%. Local pictograms more correctly interpreted and preferred than USP pictograms.
Dowse R *et al.* 2003 [21]	Community, South Africa	NR	N =130 Xhosa Respondents	46 pictograms (23 USP-DI & 23 Local pictograms)	NR	Interpretation rate increases with increasing education level. Local pictograms are more preferable than USP.
Dowse R *et al.* 2001 [22]	Local black community, South Africa	NR	N=46 Black people of Xhosa group	46 pictograms (23 USP-DI & 23 local pictograms)	NR	In pre-follow up - 30.0% Local pictograms & 8.7% USP. In post-follow up - 87.0% Local pictograms & 47.8% USP. Improvement in patients' interpretation after explanation
Hanson EC *et al.* 1995 [6]	Nursing homes, North Carolina	Interview	N= 45 Elderly and low-literate patients	14 USP-DI	NR	Before counselling 54% of pictograms were interpret incorrectly which reduced to 34% after counselling

*** NR= not recorded**

DISCUSSION

In this review, we have assessed studies designed to evaluate understanding of pharmaceutical pictogram amongst participants. We primarily focus on the studies that utilized pictograms to assess the transparency of pictograms rather than for patients' medication education. Hence, limited 13 relevant articles were selected. Research showed that studies evaluated 2 sets of pictograms such as local pictograms and standard pictogram (USP-DI & FIP) and out of total 13 articles, 10 articles have implemented a total of 50 different standard pictograms amongst which 3 commonly used pictograms were (A) Store in refrigerator (B) This medicine may make you drowsy (C) Do not drink alcohol while taking in medicine. The review suggests several key findings:

First, the process of interpreting unfamiliar pictogram was a tiring, challenging one, particularly for those respondents with less education and limited visual literacy skills **[21, 22]**. The standard education had a significant influence on interpretation of pictogram that is higher the level of education the more likely to interpret correctly as compared to those with lower education **[15, 19-21]**. A study suggested that pictogram was better understood if they were larger in size especially in elderly population. Nevertheless, both the pictogram size and at repeat presentation after explanation were independent predictors of correct interpretation. In addition, older ones were less likely to interpret pictogram more correctly than younger age, may be because of cognitive and education deficit with the increasing age **[15, 17, 19]**.

Second, on evaluating both the local and USP pictograms, local pictograms are preferred over USP pictograms as they were kept simple, clear making it familiar and culturally acceptable as well as reflecting local traditions and habits resulting in easy understanding amongst the participants **[19-22]**. A study pointed out that patient have an important voice in the discussion by providing feedback enables in the modification and designing of the pictogram **[13]**.

Lastly, in case of communication barrier, health care providers using challenging medical terminology, visual form of pictograms are well interpreted over verbal or text communication because displaying of information through visual images grabs the attention of the respondents making it understandable and facilitating long-term memory. It also helps to improve the credibility of the information provided. However, the best outcomes seen when pictograms were accompanied by verbal and text information to avoid mis-interpretation **[11, 13, 15]**.

CONCLUSION

Pictograms can serves as a communication tool and have been receiving progressive attention in the recent years. The main intention of pictogram is to ease patient adherence and reduced potential risks or error associated with the used of medications. But in this review, literature studies showed that factors like age, cultural familiarity, education level and limited visual literacy may greatly cause a variation in their ability to convey correct meaning. Yet, prior counselling accompanied by recall test/post-intervention can result in better understanding of the pictograms. Moreover, only 13 limited articles were selected to evaluate the potential understanding of the pictogram among the participants; so, to strengthen the outcome more studies should be implemented in this area by creating awareness by health care providers in order to provide a better and complete approach about pharmaceutical pictograms in the health care system.

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