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Effects of Pictograms on Patients' Information Acquisition and Preferences in Package Inserts of Over-the-counter Drugs

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Abstract: The purpose of this study is to determine the influence of package inserts of over-the-counter incorporating pictograms on information acquisition and preference. In this study, elderly (mean age=73.0 years) consumers were read one of the 3 inserts (A: insert with pictograms, B: insert with greater spacing between paragraphs, C: insert with larger font size) and asked to perform two information acquisition tasks: (a) Information recalling test, and (b) Information searching test. Afterwards, participants were given all inserts and asked to rank them according to preference using Scheffe's method of paired comparison. Results of Information recalling test shows that the correctness of Group A was significantly higher than that of Group B and C. Information searching test revealed that Group A had an accurate positioning rate that was significantly higher than those of Group B and C. The results of Scheffe's method of paired comparison show that the presence of pictograms was found to contribute positively to preference.

Keywords: *Pictograms, Package inserts of over-the-counter drugs, Information acquisition*

1. INTRODUCTION

With the government's efforts to promote self-medication [1] and the implementation of a more feasible policy of over-the-counter (hereinafter OTC) drug distribution [2-4] it has become a major concern how to effectively deliver drug information. As specified in Article 52 of the Pharmaceutical Affairs Law, the package or package inserts of a drug product must include key information, such as "dosage and administration" and "precautions for use", which, in most cases, is explicitly provided in the package inserts of a product [5]. In October 2011, "About the entry guideline on the package insert of OTC drugs" were issued to specify the content and sequence of package inserts [6] as to enhance consumers' understanding of relevant drugs by reading package inserts and using the products in a proper and safe manner.

Despite these efforts, the package inserts, as an important means of delivering drug information, require further improvements in design to improve the accuracy and effectiveness of information delivery. Hashiguchi et al. conducted a comprehension test on the "precautions for use" on the package inserts and found that over 50% of participants failed to locate the information necessary during the test because of the dense layout [7]. According to another survey on OTC drug use, consumers seldom read the "precautions for use" section carefully before using OTC drugs, which often leads to misuse and abuse of drugs, as well as delayed effective treatment [8].

As the "precautions for use" section provided with the OTC drugs is designed for a non-specific group of consumers, there is generally a lot of information. This amount of information not only makes it difficult for consumers to find the information they need, but often the information is not entirely useful for all consumers. Consequently, many consumers take no interest in reading "meaningless" instructions.

Studies have demonstrated the limits of human attention [9, 10]. It is unlikely that an individual to engage in a high cognitive-load activity such as intensive reading [11]. Therefore, one tends to extract useful information from dense data by skimming and scanning instead of reading carefully [12].

For this reason, in addition to legibility, readability, and comprehension, it is essential to increase the validity of information acquisition by raising the visibility and identification of text so that consumers can locate useful information without effort.

2. RELATED STUDIES AND RESEARCH OBJECTIVE

To increase the visibility and identification of the "precautions for use" section in package inserts, our research team developed pictograms corresponding to each of the "instructions before use" items [13]. The pictograms were then inserted into the instructions to create a layout of pictures and literary compositions. A quantitative comparative study of instructions of use

with plain text and pictograms has been conducted among young consumers. According to the results, the pictograms effectively drove young consumers to look attentively at the information they needed and improved their understandings of this information. Furthermore, compared to the instructions with plain text (i.e., description with words only), young consumers preferred the “instructions before use” with pictograms [14]. However, as only young consumers were involved in the study, a further analysis of the effect of pictograms on other age groups, especially elderly individuals, should be conducted.

With the proportion of the aging population increasing [15], it is probable that the elderly population will become the largest consumer group of OTC drugs. An individual is much more likely to be confronted with multiple health problems as he/she ages, which raises the odds of drug use in aging population in relation to other age groups. Moreover, considering the great variety of diseases, elderly individuals tend to use more drugs (which indicates a relatively high possibility of taking prescribed and OTC drugs at the same time). Furthermore, with the hypo-function of liver and kidneys, elderly individuals are exposed to a considerably higher risk of overdose or adverse drug interactions. Therefore, in terms of safe and rational drug use, elderly individuals represent a more pressing demand for understandable drug information than young consumers. However, a low sensory capability (e.g., presbyopia) and weak cognitive ability (e.g., hypomnesia) are commonly seen in the aging population who cannot acquire and process information as efficiently as young people do [16, 17]. It is found that the inappropriate design of drug information can lead to improper drug use among the elderly, such as inaccurate frequency and dosage, ignorance of contraindications, and inappropriate consumption of both prescribed and OTC drugs [18, 19]. Therefore, it is necessary to explore whether the design of drug information is favorable to the elderly in terms of information acquisition.

Many studies have proven that font size plays an important role in drug information acquisition among the elderly [20-22]. Furthermore, pictograms can draw consumers' attention and strengthen their memories for drug information [14]. However, pictograms are not as accurate as text in terms of information delivery, in that not everyone can accurately understand pictograms [13]. To ensure the accurate delivery of drug information, pictograms must be used in combination with text. Without reduction or deletion of text, a larger paper (or a greater print size) is required to increase the font size and insert pictograms. However, some studies have suggested that

using larger paper will reduce consumers' desires to read because it implies a higher cognitive load [23]. Therefore, the paper size of the printed inserts of drug products must be taken into careful consideration during the design process. Before this study, a preliminary survey was conducted, and it was found that the elderly could accept the instructions of use being printed on a piece of paper no larger than A4, a paper size defined by the ISO 216 standard. On this basis, despite most of the inserts of OTC drugs available in the market being printed on a paper smaller than A4, the authors of this paper decided to use A4 paper in the design proposed for this study.

Based on the analysis above, this study aims to probe the effect of pictograms incorporated in package inserts on information acquisition and preference of elderly consumers. Specifically, the study focuses on whether the package inserts with pictograms and on A4 paper are more favorable to the elderly, in terms of information acquisition in comparison with those with plain text on the same paper size. To this end, three designs of A4 package inserts were provided in this study: a. insert with pictograms; b. insert with greater spacing between paragraphs; and c. insert with larger font size. Subsequently, a comparative analysis was performed accordingly. Details of the three designs are provided in the next section.

3. METHOD

3.1 Participants

Sixty-six elderly individuals ($M = 71.55$, $SD = 1.48$) participated in this study. Participants were recruited from the Silver Talent Center of Chiba City. These participants should

- Never have worked in pharmaceutically related fields (Pharmacist, etc.)
- Have taken and been responsible for taking their own medication;
- If they used reading glasses, have had the glasses with them.

The present study was approved by the Independent Ethics Committee of the Graduate School of Engineering, Chiba University, and informed consent was obtained from all participants (Permit number: 29-03).

3.2 Stimulus

In the present study, three package insert versions (A, B, C) were designed regarding for a stomach medicine H2 blocker currently on the market. Each version consisted of two sides of A4 (210 × 297 millimeter) paper. All of the content and sequences designed were the same. The front

Table 1: The difference in the design of the three inserts

	Font size	Pictograms	Spacing between paragraphs
A	11-&10-point font	Inserted	With smaller spacing between paragraphs + dividing lines
B	11-&10-point font	Not inserted	With larger spacing between paragraphs + dividing lines
C	12- & 11-point font	Not inserted	With smaller spacing between paragraphs and no dividing line

page consisted of 1) the header, which consists of revision date, drug names, and classification, 2) drug characteristics, and 3) precautions for use. The back page consisted of 1) the indications, 2) dosage and administration, 3) ingredients and amount, 4) storage methods, and 5) contact details and manufacturer information. The three package insert versions were different from one other. This study marked the three insert versions as Version A, Version B, and Version C, as shown in Table 1. In Insert A, all items adopted an 11-point size font, whereas contents 10-point size font. In addition, pictograms were inserted into 10 sub-items in the “precautions for use” section, which were separated by parting line in order to improve their legibility. Insert B used the same font sizes as Insert A, and the 10 subitems in “precautions for use” sections were also separated from one another using parting lines. However, lacking pictograms, the inter-paragraph spacing between those sub-items was wider. In Insert C, no pictograms or parting line were used to separate sub-items, but a larger font size were used. As a result, all items were in a 12-point font, while the contents were in 11-point font. Figure 1 display the examples for each insert version’s “precautions for use” section.

3.3 Experimental design and procedure

This study was carried out at the Design Psychology Unit in Chiba University, from January 10th to February 6th 2018.

Sixty-six elderly individuals were averagely distributed into three groups in order to evaluate three insert versions and were marked Group A, Group B, and Group C.

Participants were tested individually. Each participant was at first asked to read one insert, which was randomly selected from the three versions. Before participants read the inserts, the following instruction was given:

“Please read the inserts carefully and imagine that your stomach is uncomfortable, and that you really need to take this medicine”.

A stopwatch was used record the time from when they started reading to having self-reported finished reading.

The information recall test and information search test were conducted to investigate information acquisition. After

Table 2: Contents of insert information recalling test

No	Items	Contents
1	Dosage and administration	What is the maximum amount you can take in one day (24-hour period)?
2	When to discontinue use	After how many days should you discontinue use?
3	Age limit	Is there age limit for taking this medicine? If so, please write the age of limit clearly.

these two tasks and a 5-minute break, participants completed a subjective evaluation of insert design. Through these tests, three insert versions were quantitatively compared. Each of the above steps is described in further detail below.

Finally, participants answered a demographic questionnaire, as seen in Table 4.

1) Insert information recall test:

This test aimed to examine the effects of insert design elements (pictograms, font size, and section space) on the information recall of elderly participants. After finishing the reading of the insert, participants were asked to complete a questionnaire about the medicine’s contents. Based on Shaver et al. [24], we set three questions in the questionnaire, as shown in Table 2. Both Question 2 and Question 3 have multiple correct answers. Specifically, the answers to Question 2 are 1) If it is ineffective after taking this medicine for 3 days and 2) Do not take this medicine for more than 2 weeks. The answers to Question 3 are 1) Children younger than 15 years old cannot take this medicine, 2) Elderly individuals older than 80 years old cannot take this medicine, and 3) Individuals older than 65 years old should consult with pharmacists or doctors when using this medicine.

2) Insert information search test:

After the above insert information recall test, participants had to undergo the insert information search test. This test aimed to investigate whether the participants can locate the relevant information correctly and quickly. With this purpose, this study set ten questions based on Hashiguchi et al. [7]. Further details are shown in Table 3.

During the experiment, we used a 24-in LCD display to present questions (as seen Figure 2: a). Before the experiment, we first interpreted the experimental methods and steps for the participants. When the experiment began, the first question was displayed on the screen, and the experimenters would recount it orally. After making sure that the participants had understood the question, we provided a paper insert the same as what they had seen before and asked them to find and mark the answer on the insert as quickly and accurately as possible. The answer tended to be a specific word or phrase. The timer started

Table 3: Items and content of the information search

No	Items	Contents
1	People with allergies	Mr. A had a rash previously, which was caused by H2 blocker drugs. Can Mr. A take this medicine?
2	People with asthma	Mr. M uses an inhaler for the treatment of asthma. Can Mr. M take this medicine?
3	People with white blood cell disorders	The doctor said that Mr. C has few white blood cells. Can Mr. C take this medicine?
4	People over 65 years old	Mr. H is 66 years old. Can Mr. H take this medicine?
5	People with sore throat and high fever	Mr. B wants to take this medicine. B has had a sore throat and high fever since yesterday. What should Ms. B do?
6	Dealing with side effects	Mr. J had a convulsion after taking this medicine. What should Mr. J do?
7	Dealing with overdose	Mr. K takes this medicine for 3 day (6 tablets) at a time. What should Mr. K do?
8	Dealing with deterioration of constipation symptom	Mr. F, after taking this medicine, had symptoms of constipation. What should Mr. K do?
9	When taking this medicine for two weeks	Mr. L has taken this medicine for two weeks. The symptoms are getting better than before but still remain. What should Mr. K do?
10	Drugs not to be used in combination	When taking this medicine, what kind of medicine should not be used in combination?

when participants began information searching and ended when they confirmed and marked the answers. After this step, the experimenter collected the paper, and the next question would be displayed. These procedures were repeated until all questions were completed (as seen in Figure 2: b). In this experiment, questions were presented in a unified order for all participants, as seen in Table 3. Furthermore, to avoid the influence of marks, a new insert was given to the participant for every question.

3) Subjective evaluation on insert design:

In this experiment, Scheffe's method of paired comparisons [25] was used to compare participants' perceptions of three versions of the inserts. We showed participants two of the three versions of inserts and asked them to answer five questions, namely "Which one propels me to read?", "Which one is easy to read?", "Which one has the most eligible layout?", "Which one is my favorite design?", and "which one is suitable to be used as drug insert?". Participants were then asked to complete an assessment table in seven phases, as shown in Figure 3. The comparison order was not taken into consideration in this research. All groups ($4C_2 = 6$) of Sheffe's ANOVA on paired comparison (Nakaya Variation) were compared.

Figure 2: Scenery and flow of information searching test **Figure 3:** Examples of assessment table in scheffe's method

4. RESULTS

4.1 Demographic characteristics

Participants' demographic characteristics are presented in Table 4. According to the results of the Chi-square test, there is no significant difference across the demographic characteristics between the three groups (Fisher's exact test, $p > 0.05$).

4.2 Results of the insert information read time

According to the time recorder, the average reading time of Group A was 280.0 seconds ($SD = 69.8$), Group B

Table 4: Demographic characteristics of participants

	Group A, (N=22)	Group B, (N=22)	Group C, (N=22)
Age, y (mean $\pm$ SD)	72.0 $\pm$ 4.0	73.6 $\pm$ 5.2	73.2 $\pm$ 3.5
Gender, n(%)			
Male	11 (50.0)	11 (50.0)	10 (50.0)
Female	11 (50.0)	11 (50.0)	12 (50.0)
People with glasses, n(%)	16 (72.7)	18 (81.8)	17 (77.3)
People with chronic illness, n(%)	17 (77.3)	11(22.7)	13 (59.1)
People with allergies, n(%)	7 (31.8)	3 (13.6)	5 (22.7)
People experiencing side effects, n(%)	6 (27.3)	5 (22.7)	2 (9.1)
People currently taking OTC, n(%)	7 (31.8)	8 (36.4)	8 (36.4)
People currently taking prescription, n(%)	18 (81.8)	17 (77.3)	13 (77.3)
Purchase frequency of OTC / year, (mean $\pm$ SD)	2.5 $\pm$ 3.7	3.5 $\pm$ 4.6	4.4 $\pm$ 3.6
Number of hospital visits / year, (mean $\pm$ SD)	6.5 $\pm$ 4.1	6.4 $\pm$ 3.9	6.7 $\pm$ 4.5

Table 5: Results of recall tests

	Group A (N=22)	Group B (N=22)	Group C (N=22)
Dosage and administration	16 (72.7) *†	8 (36.4) *	8 (36.4) †
When to discontinue use			
3 days	12 (54.5) *†	4 (18.2) *	5 (22.7) †
2 weeks	4 (18.2)	3 (13.6)	3 (18.2)
Age limit			
Younger than 15 years old	12 (54.5)	8 (36.4)	8 (36.4)
Older than 80 years old	17 (77.3)	16 (72.7)	15 (68.2)
Older than 65 years old	9 (40.9)	4 (18.2)	2 (9.1)
Total	70 (53.0) *†	43 (32.6) *	41 (31.1) †

There was a statistically significant difference between groups represented by the same symbol (* or †).

was 278.2 seconds ($SD = 56.9$), and Group C was 297.6 seconds ($SD = 37.4$). Using a one-way ANOVA procedure, the results were ($F[2, 39.17] = 1.128, p = .334$). This result implies that there was no statistically significant difference in average reading time between the three groups.

4.3 Results of the insert information recall test

The number and the percentage (correctness) of participants who answered correctly on each question are shown in Table 5. Firstly, the total mean correctness was 53% in Group A, 32.6% in Group B, and 31.1% in Group C. A Chi-squared test was performed, and the results revealed significant differences among them ($\chi^2(2) = 16.433, p = .000$). Therefore, multiple comparisons using the Ryan method were conducted, through which it was found that the correctness of Group A was significantly higher than that of Group B and C ($p < .01$).

Likewise, the correctness of each item underwent Chi-squared test, and a significant difference was noted in the correctness of item dosage and administration ($\chi^2(2) = 7.661, p = .023$) and when to discontinue use: 3 days ($\chi^2(2) = 7.442, p = .028$). Further multiple comparisons based on the Ryan procedure were employed, and Group A performed significantly better than Group B or C in terms of correctness of item in dosage and administration and when to discontinue use: 3 days ($p < .05$).

By contrast, when the remaining four items, namely when to discontinue use: 2 weeks ($\chi^2(2) = 0.340, p = 1.00$), age limit: under 15 years ($\chi^2(2) = 1.948, p = .408$), age limit: over 80 years ($\chi^2(2) = .511, p = .939$) and age limit: Older than 65 years old ($\chi^2(2) = 6.252, p = .055$) were concerned, no significant difference was detected among the three groups in term of correctness.

4.4 Results of the insert information search test

In the results analysis, we first calculated search time and then determined whether the participants successfully located the information.

Firstly, to search all information on the ten items, Group A took 238.5 s ($SD = \pm 77.0$) on average, Group B 282.4 s ($SD = \pm 133.7$), and Group C 301.1 s ($SD = \pm 126.0$). The one-way ANOVA program was employed to analyze the difference among the three groups in the total search, though no significant difference was found ($F[2, 63] = 1.718, p = .188$). Next, the same program was used in analyzing the difference in the time needed to search each item, and the time for searching Item “The use of the elders that older than 65 years old” was significantly different ($F[2, 37.483] = 3.544, p < .039$). Subsequent multiple analyses suggested that there was no significant difference in the search time across the three groups ($p > .05$). By contrast, across the remaining nine items, namely people with allergies ($F[2, 37.274] = 1.929, p = .160$), people with asthma ($F[2, 63] = 2.628, p = .080$), people with white blood cell disorders ($F[2, 63] = 1.326, p = .273$), people sore throat and high fever ($F[2, 63] = 1.854, p = .165$), dealing with side effects ($F[2, 63] = 0.168, p = .846$), dealing with overdose ($F[2, 40.074] = 0.679, p > .05$), dealing with deterioration of constipation symptoms ($F[2, 36.893] = 2.674, p = .082$), when taking this medicine for two weeks ($F[2, 38.501] = 3.110, p = .056$), and drugs not to be used in combination ($F[2, 63] = 0.1, p = .990$), were concerned, no significant difference was detected among the three groups in term of correctness (see Figure 4).

After this step, the number of people who successfully found the information and their ratio (accurate positioning rate) for each item was determined and listed in Table 6. The total accurate positioning rate for all the items was 91.4% in Group A, 78.2% in Group B, and 71.7% in Group C. A Chi-squared test of these results revealed significant difference ($\chi^2(2) = 28.082, p = .000$). Further multiple comparisons using the Ryan procedure were

Figure 4: Average time for searching each item

Table 6: Number of people that successfully found the information required (%)

	Group A (N=22)	Group B (N=22)	Group C (N=22)
1 People with allergies	19 (86.4) *†	8 (36.4) *	9 (40.9) †
2 People with asthma	20 (90.9)	18 (77.3)	15 (68.2)
3 People with white blood cell disorders	22 (100.0)	21 (95.5)	20 (90.9)
4 People over 65 years old	20 (90.9)	14 (63.6)	19 (86.4)
5 People with sore throat and high fever	17 (77.3)	15 (68.2)	17 (77.3)
6 Dealing with side effects	22 (100.0)	21 (95.5)	20 (90.9)
7 Dealing with overdose	22 (100.0) †	21 (95.5)	17 (77.3) †
8 Dealing with deterioration of constipation symptoms	19 (86.4)	17 (77.3)	12 (54.5)
9 When taking this medicine for two weeks	22 (100.0)	21 (95.5)	21 (95.5)
10 Drugs not to be used in combination	18 (81.8)	16 (72.7)	12 (54.5)
Total	201 (91.4) *†	172 (78.2) *	160 (71.7) †

There was a statistically significant difference between groups represented by the same symbol (* or †).

conducted, which resulted that Group A had an accurate positioning rate significantly higher than that of Group B and C ($p < .01$). Likewise, the accurate positioning rate of each item underwent the Chi-squared test, and a significant difference was spotted in the accurate positioning rate of in people with allergies ($\chi^2(2) = 14.074$, $p = .001$) and dealing with overdose ($\chi^2(2) = 6.338$, $p = .041$). Further multiple comparisons based on the Ryan procedure were employed, and Group A performed significantly better than Group B or C in terms of correctness of people with allergies ($p < .01$), but only better than Group C in dealing with overdose ($p < .05$). By contrast, when the remaining eight items, were concerned, no significant difference was detected among the three groups in terms of correctness.

4.5 Results of Scheffe's method of paired comparisons

The scores of all participants were placed under a variance analysis by each evaluated item, and the results were expressed with a psychological scale, as see in Figure 5. According to the results, all items under evaluation, "Which one propels me to read?", "Which one is easy to read?", "Which one has the most eligible layout?", "Which one is my favorite design?", and "Which one is suitable to be used as drug insert?" followed the order of A, B, and C in the psychological scale. A syn-position analysis showed that Group A and B were significantly different from one another at 1% for all items under evaluation. Furthermore, Groups B and C were found to be significantly different at 1% for "Which one has the most eligible layout?", and 5% for "Which one is my favorite design?".

Figure 5: Results of Scheffe's method of paired comparisons

5. DISCUSSION

In this study, by analyzing and comparing three inserts (A: insert with pictograms, B: insert with greater spacing between paragraphs, C: insert with larger font size), we demonstrated the superiority of pictograms incorporated in package inserts on information acquisition and preference of elderly consumers.

Firstly, by analyzing the results of the recall test, we found that the insertion of pictograms could significantly improve elderly individuals' memory of drug information. For the information about dosage and administration and when to discontinue use: 3 days, although the all three version of the inserts were recorded through pure text (without any pictograms), Group A was significantly superior to Group B and C in memorizing information. In cognitive psychology, people's ability to hold and manipulate limited amounts of information for a short period of time is called working memory [26]. psychology study findings confirm a major role for working memory in the control of visual selective attention [27,28], and well-designed health materials can effectively minimize extraneous cognitive demands placed on individuals, making working memory resources more available to better process content-related information [29]. Based on these theories, the results of our research indicate that the addition of pictograms into the insert reduced the reading and memorizing burden by raising the recognition of information, which allows people to focus more on the key information and memorize useful steps.

When it came to answering item when to discontinue use: 2 weeks, all three groups had low correctness rate.

There are two possible reasons behind this result, one is that being recorded behind item when to discontinue use: 3 days, it is not fully read and understood by most people, and the other is that many people may assume that there is only one correct answer to this question.

For the question concerning “age limit”, the answer “older than 80 years old” was picked by nearly 70% of all three groups, but the answer of “younger than 15 years old” was rarely picked. This result may be explained by the fact that “younger than 15 years old” is beyond the age range cared about by most of the elderly. It is reported that a person usually strategically remembered items of high-value information [30]. In this research, the participants are elderly people, therefore we can infer that the information relevant to elders is the high-value information to them, such as ‘older than 80 years old’. From the result mentioned earlier, it is apparent that those participants preferred to allocate their limited attention to information relevant to themselves.

In addition, for “older than 65 years old”, though being slightly higher than Group B and Group C, just a rate of 40.9% in Group A correctly got the information. The underlying cause for the total answer rate being below 50% may be that most people think that “people older than 65 years old should consult with pharmacists or doctors when using this medicine” did not imply age limitation. Because different from the information of “older than 80 years old” emphasizes itself by a red italic diagonal line, the information of “older than 65 years old” just uses the pictogram without any notice signal, thus the provoked impression is weaker [31]. In addition, according to the study of Hashiguchi et al, if the description of “taking elderly people” is described separately in two places the understanding of them will be hindered [7]. Therefore, we suggest that putting the relevant information of age limit together, simultaneously using pictogram to clearly show the relation between those information. We consider it is effective to improve the acquisition.

In light of the information search test, we found that the total accurate positioning rate of Group A reached 91.4% which was significantly higher than that of Group B and C. This result proved that the addition of pictograms into the insert is conducive in the information search. It is especially evident in the first question item “allergies”, that Group A’s positioning rate was significantly higher than that of Group B and C. As for the word “allergies”, besides the position “precautions for use: People who can’t take it” recorded in correct answer, it was also recorded in “precautions for use: People who should consult with pharmacists or doctors when using this medicine”. Furthermore, “redness”

and “rash” in the question were also recorded in the “side effects” column. This result may largely account for why most of the participants failed to determine the correct position of the information recording, for almost all of those failing participants left marks in these two places. Moreover, although no significant difference appeared in the accurate positioning rate of other raised items, Group A could still have displayed the inclination of having a higher accurate positioning rate than Group C in many items, such as dealing with overdose and dealing with deterioration of constipation symptoms. These results consistent with previous research that the addition of pictograms into the insert is conducive in the information search [32].

Nevertheless, no prominent strengths were found from the addition of pictograms into insets in term of information search time, which was below our expectation. Two possible reasons for this are as follows: firstly, the pictograms we used were newly developed instead of being familiar to the general public; and secondly, the recognition and understanding of the pictograms remained low, and some of them failed to meet criteria in the understanding test [13]. Therefore, in order to further increase the effectiveness of the pictograms, it is important to develop highly recognizable and understandable pictograms.

Through Scheffe’s method of paired comparisons, we found that the inserts with pictograms were significantly more effective than only text insets in the evaluations. This result shows that the insertion of pictograms makes it easier for consumers to read information and is likely to promote reading. In addition, through the evaluation of “layout” and “favorite”, the use of wider paragraph spacing and parting lines to separate the items in the design of the insert significantly improves preference. However, it is worthwhile to mention that the font size maybe need to reach a certain size, for example, greater than 10 point size.

6. CONCLUSION

The application of OTC drugs is not only significant to consumers’ self-medication, but also can promote the rational distribution of limited medical resources. This study identified that the presence of pictograms contributes positively to both information acquisition and preference. To further improve consumers’ information acquisition and preferences of package inserts of OTC drugs, we must develop high-quality pictograms that are easier to identify and understand. In order to promote the using of pictograms, they are should be unified and standardized in the future.

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