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Usability of Yellow Striped Pavements by Visually Handicapped People in Hatay

Hatay'da Bulunan Sarı Şeritli Kaldırımların Görme Engelliler Tarafından Kullanılabilirliği

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Abstract

The most important problem experinced by visually impaired individuals is inadequacy of opportunities and inequality of opportunities with other people. The yellow striped pavement was made to help distance-place-direction sense while walking, to meet the needs of constant self-awareness to remove a possible accident situation has a very important place for the visually impaired. Our aim is to investigate the usability of yellow striped pavements applied to

Öz

Görme engelli bir kişinin yaşadığı en önemli sorun, gözlerinin görmemesi değil; kendisine sağlanan olanakların yetersizliği ve diğer insanlarla arasındaki fırsat eşitsizliğidir. Yürürken mesafe-yer-yön duygusunu kontrol etme, sürekli kendilerini fark ettirme ihtiyaçlarını gidermek ve olası bir kaza durumunu ortadan kaldırmak için yapılan sarı şeritli kaldırımlar, görme engelliler için oldukça önemli bir yere sahiptir. Görme engellilerin sosyal yaşama tam

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the sides of the road by visually impaired people in Hatay. A total of 25 visually impaired individuals, 8 women and 17 men, were included in the study. A self-reported questionnaire was applied.

The frequency of using yellow striped pavements was found, as using permanently 28 %, using partially 36%, using difficulty 4%, and never using 32%. Individuals who were found that defined the yellow striped pavements as useful 48%, the partially useful 20% and undecided as 32%. The sufficiency of yellow striped pavements in Hatay was defined as 20% adequate, 52% undecided and 28% insufficient. There was a significant difference between using the yellow stripped pavements and helpfulness in walking independently in the street ($p<0.005$). The fact that the majority of the subjects thought undecided insufficiency of the yellow striped pavements and individuals participated study generally go out with an assistant showed us these striped pavements are not enough. Participants stated that the strips laid on the sidewalks were not felt with the white cane and the strips were too wide and did not serve safe walking.

The bad proper design of the pavements, the failure to obey the law, the desensitization of the society constitutes a bigger obstacle for the people with handicapped.

Keywords: *Visual İmpairments, Pavements, Usability, Yellow Striped*

olarak adaptasyonunu artırmak amacıyla yol kenarlarına uygulanan sarı şeritli kaldırım hakkında düşüncelerini almak ve bu şeritlerin kullanılabilirliğini araştırmak amacıyla çalışma planlanmıştır. Çalışma 8'i kadın ve 17'si erkek olmak üzere toplam 25 görme engelli birey ile gerçekleştirilmiştir. Sarı çizgili kaldırımların kullanılabilirliği sorgulandığında katılımcıların % 28'i sürekli, % 36 kısmi zorlukla, % 4'ü zorlanarak kullandığını, %36'sı ise hiç kullanmadığını ifade etmiştir. Sarı çizgili kaldırımları faydalı bulanlar % 48, kısmen faydalı bulanlar %20, faydası konusunda kararsız olanların oranı %32 olarak hesaplanmıştır. Hatay'da bulunan sarı çizgili kaldırımları yeterli bulanlar % 20, kararsız olanlar % 52 ve yetersiz bulanlar % 28'dir. Sarı şeritli kaldırımların kullanılabilirliği ile sokakta bağımsız olarak yürümeye yardımcı olma arasında istatiksel açıdan anlamlı fark bulunmuştur ($p <0.05$). Katılımcıların çoğunluğunun sarı çizgili kaldırımların yetersiz olduğunu vurgulaması, genellikle yardımsız dışarı çıkamamaları kaldırımların yeterli olmadığını göstermiştir. Kaldırımlardaki şeritlerin beyaz bastonla hissedilememesi ve şeritlerin aralarının çok geniş olması nedeniyle kaldırımların güvenli bir yürüyüşe hizmet etmedikleri saptanmıştır. Kaldırımların kötü dizaynı, kaldırımlar ile ilgili kurallara uyulmaması, toplumun duyarsızlaştırılması, engelli insanlar için daha büyük bir engel teşkil etmektedir.

Anahtar Kelimeler: *Görme Engelliler, Kaldırımlar, Kullanılabilirlik, Sarı Şeritler*

Introduction

Tactile paving is a system of textured ground surface indicators found in public environments to help blind and visually impaired persons to identify and distinguish potentially hazardous locations and then move and reach their expected destinations and then move in the right direction to reach their expected destinations .Tactile paving is made from various materials consisting of a series of tactile indicators (dot-shaped or bar-shaped). Tactile paving has different names in different countries, including truncated domes, detectable warnings, tactile ground surface indicators, tactile guide paths, and yellow striped pavements[1,2].

The commonly noticed and direct objective of tactile paving is to support and guide blind and visually impaired walkers in approaching the expected destinations. Tactile paving was invented several decades ago. At the present time, it is commonly implemented in many cities, but criticisms about its insufficient design for particular users as well as other people are still frequently heard.

Tactile paving cannot be distinguished clearly, easily, and consistently, which leads to hurdles and sometimes critical trouble and danger for users. Unlike in the past when blind and visually impaired persons lived within cities or even small communities, in recent years they are more outreached to visit different places[3].

It is known that age-related eye disease has increased in recent years, so tactile paving is essential in daily living. Enabling independent and safe mobility for visually impaired individuals through a ground surface that is detectable through the soles of the shoes and by the use of a long white cane is a possibility of life[2].

Yellow striped pavement is made to help the distance–place–direction sense while walking to meet the need for constant self-awareness. Yellow striped pavement has a very important place in preventing possible accident situations for the visually impaired[4].

Therefore the purpose of this study was to investigate the usability of yellow striped pavements applied to the sides of the road among visually impaired people in Hatay.

Material and Methods

Twenty-five participants who met the criteria volunteered to participate were included the study. Our institutional ethics board approved all protocols, the patients gave informed consent before participating in the study (ethical approval number: 31/10/2014/191). A self-report questionnaire was applied. We measured outdoor tactile ground surface with a tape measure.

The blind people included in the study answered the questions using the face-to-face survey method in the presence of one witness chosen by the participant.

Our survey consists of demographic information and nine questions. The participants responded verbally by giving the opinion that best suited them. We recorded the age, gender, marital status, education, and employment status of participants as demographic data.

Questions concerned visual function, visual impairment, age of onset of visual impairment, presence of other impairments, going outside, frequency of using yellow striped pavement, the sufficiency of the yellow striped pavements, and whether there were comments that they wanted to add.

Results were analysed with SPSS software. Descriptive statistics with frequency and ratio were analysed. Correlations were determined by using Pearson tests. An α (p) value less than or equal to 0.05 was considered statistically significant

Results

A total of 25 visually impaired individuals aged between 14 and 70 years, including 8 women and 17 men, were included in the study. Eight women (32%) aged between 8 and 57 years (26.87 ± 19.30 years) and 17 men (68%) aged between 7 and 65 years (27.94 ± 18.30) participated.

Demographic information about participants was recorded and is shown in Table 1. We recorded that 52% of participants had not completed school, 32% were students, and 64% were single. We measured a tactile surface had six parallel directional strips with dimensions of 400 × 400 mm. The tactile surface with dimensions of 400 × 400 mm had 49 warning domes.

When we questioned participants about their visual function, we found that 56% of the participants did not see but had light perception while 8% of them did not see and had no light perception. 80% of participant declared the time of occurence of visual impairment was congenitally, while 20 % participants stated acquired in a while. The participants did not have any disabilities other than visual impairment (Table 2).

Going out independently was very important for people with visual impairments. We asked them how they usually went out. We found that 52% of participants went out with an assistant, 40% went out alone, and 8% did not go out from the house. They thought that they were challenged because of their disability while going out independently (Table 3).

We found that 36% of participants used yellow striped pavements sometimes, 28% always, 32% never, and 4% with difficulty. The majority of participants (%68) stated that yellow striped pavements were useful, but 32% responded that they were undecided. When we asked about the sufficiency of yellow striped pavements in Hatay, 52% of participants responded that they were very undecided, while 20% thought they were adequate and 28% considered them insufficient (Table 3).

There were significant correlation between question about the usefulness of the pavements and age ($p = 0.01$, $r = 0.50$). It was also found that there was a correlation between occurrence time of the blindness and the frequency of use of yellow striped pavements ($p = 0.03$, $r = 0.41$) (Table 4).
We found that there was a significant relationship between going out independently and visual function status ($p = 0.01$, $r = 0.72$) (Table 4).

Discussion

Many tactile surfaces such as yellow striped pavements are architectural adaptations for visually impaired people[5]. We investigated the availability of these architectural adaptations in daily living. A total of 25 visually impaired individuals aged between 14 and 70 years participated in the study. There was a wide range of age in our study. With regard to educational status, a large number of participants had not completed school or had attended only primary school. It is the fact that the level of education is low among people with visual impairments in Hatay.

We found that many participants were unemployed. Working is very important in daily living, especially for people with impairments. When we asked about visual status, we found that 56% of

participants could not see but had light perception while 8% did not see and had no light perception and 28% had problems with seeing. It was found that that the time of the occurrence of visual impairment was 80% congenital and 20% acquired. The participants did not have any disability other than visual impairment. Going out independently was very important for people with visual impairments. We found that 52% of participants went out with an assistant. They thought that they were challenged because of their disability when going out independently and most of them stated that they had difficulty while going out. This is a big problem not only for visually impaired people just for all people with disabilities. In our study, 64% of participants reported that they were able to use yellow striped pavements. Although they found them useful when we asked the sufficiency of the pavements, 52% of them were undecided about the adequacy and 28% declared that yellow striped pavements were insufficient.

Daily living activities such as transporting, work, school, shopping are important for people with disabilities[6]. Local governments have an important role to play in the shaping of urban space through social and technical infrastructure investments. The fact that urban transport services are provided to local administrations so that all kinds of open spaces and structures will be accessible to disabled people in the city is the most important element that provides equal opportunity for disabled people to participate in social life[7].

The usability and interpretability of tactile paving by visually impaired people have been researched by projects. Tactile guide roads can assist blind people in following a specific route by using their shod feet to identify and distinguish raised patterns. Courtney and Chow (2000) [8] assessed tile designs for tactile guide pathways. Two kinds of tile designs were assessed. They found that junction discrimination accuracy and time were significantly better for the new design than the old design . Following the roads were liable on cutaneous stimulation and kinaesthetic stimulation such as supination and pronation twists of ankles provoked by the strip pattern on pathway tiles. It was not important whether the path was new or old but more training and experience might be necessary to make the new guide paths acceptable to visually impaired people. They didn't mention the usability of the path but only considered the design[8,9]. In our study, individuals used new pathways in Hatay and we assessed the usability.

Øvstedal et al. (2005)[10] investigated tactile indicators in a street environment with patterns and designs based on the conclusions of recent studies in Sweden and Norway. They wanted to use the best knowledge from recent studies to define continuous routes through cities with integrated tactile indicators where orientation cues are incomplete and to assess the solutions in real street surroundings and traffic conditions. They declared that a profile height of 5 mm was the best compromise between tactile detection and journey risk. They used a field test and questioned the individuals. They collected limited information like our study. They stated that their study would experience for new studies. In our study, individuals reported a lack of accessibility conditions, like Øvstedal et al. (2005)[10].

Siu (2012) [11] researched the accessibility of park environments and facilities for the visually impaired. The study adopted an approach to park environments and facilities. The investigator declared that park environments were very important for independence in daily living for people with visual impairments[11]. Our participants considered yellow striped pavements were usable. The usability and accessibility of roads and parks were similar in our study.

Kobayashi et al. (2005)[12] investigated gait analysis of people walking on tactile ground surface indicators. They found that using tactile ground surface causes extra movements of the lower extremities. One of the reasons for the extra movements of the lower extremities was a functional leg length discrepancy while walking on the indicators. They planned a new surface with a recessed tactile surface, which was effective in reducing the additional movements while walking on the path in which indicators were installed. We did not assess walking in our study but we assessed the frequency of use of this tactile surface. In our study, participants stated that the strips laid on the sidewalks were not felt with the white cane, were too wide, and did not facilitate safe walking.

Fujiyama et al. (2005)[13] evaluated the wide of tactile ground surface indicators and its effects on users' detection abilities. Thirty-four participants with visual impairment used with the can feel the road. They evaluated the width and found that the typical width of 300 mm is effective; adding 100 mm improves the effectiveness but when the width is 600 mm the detection rate reaches 100%. We measured a tactile surface with dimensions of 400 × 400 mm and six parallel directional strips. The tactile surface with dimensions of 400 × 400 mm had 49 warning domes. Different widths are considered in the literature. Our participants stated that the strips or width of the surface was too wide and could not be felt with the white cane.

Rosburg (2008)[14] stated that it is important to understand the usability of yellow striped pavements. Their design can be different in different countries, but the successful use of tactile floor indicators depends crucially on visually impaired pedestrians understanding the different meanings represented by these signs and being informed of the presence like these facilities.

Lu et al. (2008)[3] evaluated tactile paving design standards in different countries. The study focused on the factors of type, form, and colour in constituting the standards of tactile paving, tried to identify the problems of tactile paving in China, and then offered some insights for importance and further research. They stated that the users of the tactile paving were particularly people who had lost all or part of their vision capability. In our study, 56% of participants did not see but had light perception, 8% did not see and had no light perception, and 28% had problems with their vision. These participiants declared that people with visual impairment have difficulty in daily living while going out independently. We found that 52% of participants went out with an assistant, 40% went out alone, and 8% did not go out of the house. They thought that they were challenged because of their disability when going out independently. Seventy-eight per cent of them declared that they had difficulty when going out. Countries have established very different and detailed standards to unify the forms and sizes of tactile paving. Like the literature, we considered a tactile ground surface with dimensions of 400 × 400 mm.

In different countries, yellow stripped pavement is called by different names. The literature supports the proposition that yellow has the highest brightness level and is attractive in vision in the colour system, so yellow can be identified by visually impaired individuals even under conditions of insufficient light.

Lauria (2017)[2] studied the detectability of contrasting walking surface materials. Age, health status, age of onset, and degree of loss were important to detect contrasts in pavements. Older people who lost their sight through certain medical conditions such as diabetes may well have decreased

sensitivity in their feet so environmental conditions may strongly affect the detectability of tactile paving.

The fact that the majority of the subjects are undecided about the sufficiency of the yellow striped pavements and individuals participating in the study generally go out with an assistant showed us that these striped pavements were not enough.

Participants stated that the strips laid on the sidewalks were not felt with the white cane, were too wide, and did not facilitate safe walking. In contrast to our study, Parkin and Smithies (2012)[15] declared that tactile and guidance paving was easily identifiable.

The improper design of the pavements, failure to obey the law, and desensitization of society constitute bigger obstacles for people with handicaps.

Limitations and power of our study

This research was conducted only in Hatay. The number of participants was insufficient.

Participants were asked questions and their comments and replies were recorded. There are few studies about the comments of people with visual impairments on this issue. This is advantage of the study.

Conclusion

The fact that the participiants were undecided about the sufficiency of the yellow striped pavements. Going out with an assistant showed us that these striped pavements are not enough. Local governments need to consider the criticism in this regard. In addition, more studies need to be done on the ideal size and usability of the pavements.

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Tables

Table 1. Demographic Information

Variables		n	%
Sex	Women	8	32
	Men	17	68
Marital status	Married	8	32
	Single	16	64
	Widow	1	4
Education	Illiterate	4	16
	Primary school	13	52
	High school	5	20

	Undergraduate	1	4
	Bachelor's degree or higher	2	8
Employment status	Officer	6	24
	Worker	2	8
	Unemployed	4	16
	Housewife	2	8
	Student	8	32
	Artist	1	4
Age	0-17 years old: underage	8	32
	18-65 years old: youth/young	17	68

Table 2. Questions about Vision Function

		N	%
Visual function	I do not see; I have no light perception	2	8
	I do not see; I have light perception	14	56
	I see a little no reading and writing	2	8
	I see a little I read with ink writings warning	4	16
	I have partial loss of vision	3	12
Time of occurrence of visual impairment	Congenital	20	80
	Acquired	5	20
Are there any disability other than your visual impairment?	Yes	0	0
	No	25	100

Table 3. Questions about Going out status and Yellow Striped Pavements

Questions about Going Out Status		n	%
How do you usually go out?	Alone	10	40
	With an assistant	13	52
	I do not go out of the house	2	8
	Yes, I have difficulty	10	40

Do you think you are challenged because of your disability when you go out independently?	Some difficulty	9	36
	Undecided	2	8
	No difficulty	2	8
	This depends on urban arrangements and not on barriers	2	8
Questions about Yellow Striped Pavements			
Frequency of using yellow striped pavements	Use permanently	7	28
	Use partially	9	36
	Use with difficulty	1	4
	Never use	8	32
Are the yellow striped pavements useful?	Useful	12	48
	Partially useful	5	20
	Undecided	8	32
Are the yellow striped pavements sufficient in Hatay?	Yes, adequate	5	20
	Undecided	13	52
	No, insufficient	7	28

Table 4. Correlations Table

		Are the yellow striped pavements useful?	Are the yellow striped pavements sufficient in Hatay	Age	The time of occurrence of visual impairment	Frequency of using yellow striped pavements	Going Out Status	Visual Function
Are the yellow striped pavements useful?	r	1	0.21	**0.50***	0.31	**0.66***	0.04	0.18
	p		0.29	0.01	0.12	0.00	0.81	0.38

Are the yellow striped pavements sufficient in Hatay	r	0.21	1	0.39	0.37	0.15	0.04	-0.01
	p	0.29		0.05	0.06	0.45	0.85	0.93
Age	r	**0.50***	0.39	1	**0.73***	0.34	0.18	0.05
	p	0.01	0.05		0.00	0.09	0.37	0.81
The time of occurrence of visual impairment	r	0.31	0.37	**0.73***	1	**0.41***	0.04	-0.03
	p	0.12	0.06	0.00		0.03	0.81	0.87
Frequency of using yellow striped pavements	r	**0.66***	0.15	0.34	**0.41***	1	0.35	0.31
	p	0.00	0.45	0.09	0.03		0.07	0.12
Going Out Status	r	0.04	0.04	0.18	0.04	0.35	1	**0.72***
	p	0.81	0.85	0.37	0.81	0.07		0.00
Visual Function	r	0.18	-0.01	0.05	-0.03	0.31	**0.72***	1
	p	0.38	0.93	0.81	0.87	0.12	0.00	