



# Investigation of Design Principles and Users Demand for Hospital Gardens: Case Study of Egirdir-Turkey

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## Authors' contributions

*This work was carried out in collaboration between all authors. Authors CKS and AG designed the study, wrote the protocol and wrote the first draft of the manuscript. Author OKO managed the land searches, analyses of the performed the study. Authors SE and SA managed the questionnaires. All authors read and approved the final manuscript.*

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## ABSTRACT

**Aims:** The plants in hospital garden have many functions to users. Hence attention on those areas should be done. A specific hospital and its gardens chosen to be determine expectations and express of users to determine suggestions for hospital garden to be improved.

**Study Design:** The Egirdir Bone Joint Diseases Treatment and Rehabilitation Hospital (EBH) was chosen as a model hospital for evaluating expectation from hospital gardens and landscape design suggestions of different user groups. A questionnaire was prepared to ask proposed groups for determining expectations, demand, reflection of hospital garden to them, suggestions noted on improving garden design and functionality.

**Methodology:** The study conducted with face to face survey technique of those groups. The questionnaire was prepared to ask the participants for evaluating reflection of hospital garden to

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them, suggestions on improving garden design and functionality. The basic principle for design of hospital structure should be prioritizing all serving users with satisfaction. The survey was conducted on 93 females and 57 males in total of 150 participants.

**Results:** The plant forms, texture, color, smell, light, shade and seasonal changes with different plant composition should be created in EBH garden. However, the creation of a focal point suggested. Hence, it was suggested to use pyramid-shaped plants, especially columns should be preferred in the EBH's garden. Even some evergreen plants and prune through formal and informal as solitary figures could also be considered during plantation as well. Moreover, calming and soothing soft colors such as; green, blue, white, lilac, red and orange colors should be preferred in these kinds of places (e.g., hospital gardens). It was clearly observed that the demands, trends, perceptions and needs to be taken into account during design of hospital and its surround for satisfying users.

*Keywords: Hospital gardens; Egirdir-Turkey; user expectations; landscape design.*

## 1. INTRODUCTION

Since human being, people have been contact with nature and living in at various ways. In modern world, the gardens have become important places to grief to rest, heal and wellness for people. However, people have believed that gardens have reduced stress with improving life comforts [1]. Moreover, gardens in nursing homes, rehabilitation centers and hospitals are aiming to influence for the better the health status. Hence, organization and maintenance of those gardens is influenced people and that sometimes called as '*healing garden*' [2].

People have examined and diagnosis in hospitals for diseases and implements the treatments. Hence, open fields or gardens in hospital context have important function. It has already reported a number of scientist that open spaces have provides the motivation effects on sick people with improving physical relaxation, navigation, stress reduction, increase the feeling of well-being, memory refreshment [2,3]. However, Tipi [2] proposed that there are two main group that actively used hospitals and its environment. One of these groups is the administrative and medical staff who is constantly companion and usually called as '*active users*'. The second groups that are patients and visitors have been used by the variable time intervals with a temporary companion are called as '*passive users*'. Both *active* and *passive* users have integrated in hospital structure to get benefit mental healing as well as therapeutic and relaxing in hospital gardens. It has already well established that the open spaces and gardens have provided positive contributions to people's mental wellness. Hence, these places have contribute to people

who need relaxing, soothing, comfortable setting and enhancing social communications to each other's. In this case, the hospital gardens or healing environments have been positive effects on not only *active users* but also *passive* users as well. For that reason, certain standards and rules necessary to established gardens and open spaces in hospital context with the well arrange interior and exterior design of specialization [4].

Marcus and Barnes [3] describe the contribution of the healing process in three main stages. These are:

- Physical symptom elimination of disease,
- Physically and emotionally stress relaxation of individuals in medical environment,
- Feeling of well-being of patients who are seen chronic diseases.

Hence, stress relaxation and feeling of well-being of patients in medical environment can be done with well-organized open spaces and hospital gardens.

The hospitals have encouraging patients to life-binding with the garden. It has already well explained that the hospital gardens have positive effects on patients whenever they close contact with the nature in these lands. However, these areas have already proposed to be relief and effective in controlling pain and surgical interventions as well as improving motivations of patients [2,5-9].

It was shown that in hospital, patients that have window views on gardens from their room have positively affected for relief. However, their relatives have also felt positively and their satisfaction increased from the hospital [8,10].

They wanted to see trees, flowers, lawns and those help patients to relief some level. In contrast the patients who remain in hospital room without window view (no nature seen) whenever they out of hospital after surgery, some complications may arise such as; headaches, nausea etc. [8,10]. Moreover, Heerwagen and Orians [11] reported that even some aesthetic landscape photographs that shown to patients have helpful to reduce the patient's stress some level. Ulrich [12,13] were done further work on hospital gardens with some laboratory and clinical research. They reported that patients even in less than five minutes contact with nature significantly improving some health problems such as; stress, blood pressure, heart activity, muscle strain and brain. In addition, Sherman et al. [14] found that the mechanism of human nature have closely associated with the stress and psychological trauma. Therefore open spaces and gardens in hospital context should be well organized and established a link between nature and human life. Marcus and Barnes [3], proposed that health care providers should have respect to the employees of the hospitals while liberation of job stress and the driving conditions in the hospital gardens. It has already well-established that natural areas have drawn the attention of patients. It was reported that the children's have also similar responds as adults on hospital gardens while the healing stress was the basic benefits for users of hospital gardens [15]. Karakaya and Kiper [7] proposed that a poll should be conduct for hospital users to improve gardens and open spaces. The hospital gardens have usually expressed as positive benefits to users. These fields affect remedial, therapeutic and relaxing features to users. However, it is also integrate with human nature to provide the human physical, intellectual and mental dimension. Moreover, these fields should consider being not only patients, relatives and visitors but also hospital and hospital related staff. Therefore the design and management of the hospital garden are needed specific design approaches and emerging as the subject of a study that requires.

Landscape architecture is an architecture discipline that deals with environment of buildings and constructions, aiming to well organizing open spaces, gardens and green areas, so on. Hence, well-organized environment help people to physical relaxation, stress reduction, increase the feeling of well-being and comfort of live in modern world. However, the landscape practices in hospital context can be

divided to two main groups. They are; '*increasing aesthetic appearance*' and '*improve functionality*' of those areas.

In aesthetic organizations, one of the design criteria must be relaxing and refreshment for patients and also calming for visitors. Hence objects and plant materials should be used for that purposes. In functional improvement, the user's expectations from those particular areas could be carefully determined. However, when having information on user's expectations, it can be easy to organize and design these areas with one of the most accurate ways. On contrast, if garden and its environment have organized without user's demand, this can cause moral damage of users.

In this study, with having literature information as summarize in above, current status of hospital gardens in Turkey have been overviewed. In particularly, a case study hospital garden of Egirdir Bone and Joint Diseases Treatment and Rehabilitation Hospital (EBH), Turkey has been evaluated in view of landscape architecture discipline. However, expectations of both active and passive users have been determined. Hence, it is aimed to identify trends and expectations of that hospital garden. Some suggestions for design practices have also provided.

## 2. MATERIALS AND METHODS

Egirdir is a township of Isparta city where located in the Mediterranean region of Turkey. This area is also called *Lakes Region* due to many lakes located in that area. The Egirdir is coast to the Eğırdir lake which is 4'th largest lake in Turkey. It is an important tourism center due to rich historical heritages and great potential in terms of nature sightseeing. It has attracted increasing number of domestic and international tourists every year.

The study material is government managed a hospital located in Egirdir Township called '*Egirdir Bone and Joint Diseases Treatment and Rehabilitation Hospital (EBH)*'. This hospital has very high reputation in Turkey due to the fact that only one of a few hospitals specialized on specific bone and joint diseases. Hence, observations and field surveys made at the hospital site. During field visits and observations, some necessary photos have taken and oral interviews conduct with visitors and staff. Field surveying, data collection and interviews were done.



**Fig. 1. General view of Egirdir Bone and Joint Diseases Treatment and Rehabilitation Hospital (EBH)**

The EBH and its environment were analyzed in both interior and exterior design principles. However, particularly, EBH's garden was carefully analyzed in view of landscape discipline. The face to face survey method were used for somehow user of the EBH for various purposes (workers, patients, staff and visitors). This approach was considered to be most effective way and recommended by many literatures finding on similar research [16].

In different times of a day, half an hour to one hour was spend in the EBH to conduct survey questions to participants. The participants were classified as six different subgroups according to their specialization and aim of the use hospital. These groups are numbered as follows;

1. Group: Doctors,
2. Group: Nurses.
3. Group: Service staff (other than health staff)
4. Group: Patients
5. Group: Companions

In each subgroups had 30 randomly chosen participants. Hence, total of 150 participants that were chosen randomly, were attended that survey. The respond of participants for EBH's garden design principles were analyzed according to survey results and standards were put forward. However, in advance of face to face interview and questionnaire conduction, some suggestion and opinions from responders have been noted for better design suggestion of that area.

## **2.1 Workspace Properties**

The research conducted in EBH, was founded in 1952. It was opened with a capacity of 100 beds during that time. However, due to the high demand and reputation, additional nine story building was added to hospital complex with 1000 bed capacity in 1986. In hospital complex, animal lab, physical therapy units, nursery, worship room, some workshops and living quarters have been supplied. It has approx. 78.420 square meters field land. However, 31.510 (46910 square meter) of that area have served as the garden. It is a government base specialized branch hospital status and belongs to The Ministry of Health. In the hospital, the total of 246 employees with 36 administrators was actively in service in that time. The aerial view of hospital given in Fig. 1. The further information on Egirdir Township as well as EBH can be found elsewhere [17].

## **3. RESULTS AND DISCUSSION**

### **3.1 Profile of Participants**

The survey was conducted on 93 females (62%) and 57 males (38%) in total of 150 participants. It can be seen that the majority of participant's age group (60%) was between 26-45 years of age. According to status of education, many of participants is primary school (26%) and college (26%) diploma (Table 1).

### 3.2 Participants' Expectations and Demands

Table 2 shows questionnaire summary for the question of 'is the hospital ground important for you?' However, the majority of participants (68%) declared as 'important', while 35 people declared as 'not important'. In addition, 15 people declared as 'partly important' and 8 people declared 'no idea'. Moreover, the majority of patients (24 people) and patient relatives (25 people) were expressed that question to 'important'.

Ulrich [6] was conducted a survey research on hospital staff (rather than patients). He found that majority of responders express as the hospital gardens of very important for hospital staff to relax in garden, something to eat and drink, just give specific places to sit with patients and trying to give the patients to moral. The result found in our study consisted this information.

Table 3 shows questionnaire summary for the question of 'What is the meaning of hospital garden for you?' However, the majority of them

(31% and 19%) describe as 'soothing and relaxing' and 'spend time'. In addition, some of participants said 'nature' (16%), 'satisfy social require' (15%) and 'life' (11%), respectively (Table 3).

Marcus and Barnes [18] and Sakıcı et al. [4] stated that hospital gardens have mostly concern on therapeutic environments and utilized as living venues, recreation, navigation, observation activities. In our study we found more less similar results with those literature findings.

Table 4 shows questionnaire summary for the question of 'How can increase quality of life in hospital garden?'. The majority of responders expressed as 'functionality and variety design' (20.4%), and 'clean and hygienic' (16.3%). However some of participants said easy of accessibility (12.5%), comfort (11.9%) and regular form (10.5%) respectively. Ulrich [6] and Marcus and Barnes [3] have proposed that in order to increase the quality of life in the hospital gardens, it should be clean and hygienic and be regular form.

**Table 1. Profile of participants**

		Participant groups					Total	Percent (%)
		1	2	3	4	5		
Sex	Male	13	0	16	14	14	57	62.0
	Female	17	30	14	16	16	93	38.0
Age groups	<14	0	1	0	1	0	2	1.3
	14-25	1	14	6	2	7	30	20.0
	26-45	25	15	22	12	16	90	60.0
	46-65	3	0	2	9	7	21	14.0
	65<	1	0	0	6	0	7	7.0
Education levels	Primary school	0	0	10	16	13	39	26.0
	High school	0	0	11	5	8	24	16.0
	College	0	27	7	2	3	39	26.0
	Undergraduate	11	3	2	7	6	29	19.3
	Postgraduate	19	0	0	0	0	19	12.7

**Table 2. The participants respond to question of 'is the hospital ground important?'**

Participants groups	Important	Not important	Partial important	No idea
1	21	1	7	1
2	20	1	8	1
3	23	0	6	1
4	27	-	3	0
5	26	0	3	1
Total	117	2	27	4
Total percent (%)	78	1.3	18	2.7

**Table 3. The participants respond to question of 'what is the meaning of hospital garden for you?'**

Participant groups	A	B	C	D	E	F	G
1	7	25	0	13	5	9	0
2	5	22	1	10	11	12	0
3	1	2	0	7	11	13	3
4	13	23	18	11	5	6	0
5	9	25	4	9	14	19	0
Total	35	97	23	50	46	59	3
Percent (%)	11	31	7	16	15	19	1

(A. Life, B. Soothing and relaxing, C. Alleviate pain, D. Nature E. Satisfy social require, F. Spend time, G. No idea)

For to question 'Which activities/functions or equipment's should be think for hospital garden design?', the majority of participants have expressed that hospital garden should have versatile equipment for users such as; seating and resting places (29.3%). Moreover, when asking to responders for the specifying about those equipment's; they expressed as; cafe/restaurant (17.1%), decorative pools and waterfalls (10.7%), parking lots (9.1%), vista points and watching terraces (5.6 %), walking paths (4.2%), reading places (3.5%), sports areas (3.3%), garbage cans (3.0%), shopping areas (2.8%), and others respectively.

Bulut and Goktug [19] proposed that the hospital grounds are directly effect on the satisfaction of patients and their relatives while increases the staff's satisfaction and its qualified personnel.

For to question 'Which activities can you be happy in hospital garden?', Most of participants preferred to watch of landscape and plants (24.2%), listen to the sound of water and watch

of water (19.5%), chatting (13.2%), reading of newspaper and book (11.6%), walking and trip in garden (6.9%), sunbathe (5.3%) and others, respectively.

Hence, questionnaire summary for the question of 'which materials should be prefer to landscape furniture and construction in hospital garden?' as follows; the majority of participants suggested being structural reinforcement materials, following woody (58.7%), mixed (16.0%), plastics (14.7%), 4.0 % iron, 1.3% pavement and not important (5.3%) in garden design. However 5.3% of participants expressed as ground material is not important for itself. Brawley [20] have similar result reported as found in this study.

However, the majority of participants (79%) suggested as the entry of hospital should be separated as patients, patient relatives and hospital staff where as 10% of responders expressed as not be allocated to entry. Interestingly, all the nurses and doctors (100%) responded as the entries must be separated completely.

Whitehouse et al. [15] studied on color preferences of visitors in terms of healing. They found that the colors have key role in healing and made influences on patients. Hence the questionnaire question of 'What is your favorite color for healing or well feeling' directed to participants and summary responds of that question as follows; the majority of participants expressed as green color and its tones (53%) following blue (25.5%), lilac (8.7%), orange (8.1%), red (7.4%), yellow (7.4%), grey (6.0%), white (5.4%), pink (4.7%) and black (3.4%) in that order.

**Table 4. The participants respond to question of 'How can increase quality of life in garden?'**

Participant groups	A	B	C	D	E	F	G	H	I	J
1	11	23	9	10	7	0	16	6	6	1
2	8	17	4	8	14	5	12	7	6	8
3	13	18	7	11	9	2	17	7	2	3
4	6	17	9	15	10	5	13	10	1	4
5	9	16	10	12	13	1	15	4	1	9
Total	47	91	39	56	53	13	73	34	16	25
Percent (%)	10.5	20.4	8.7	12.5	11.9	2.9	16.3	7.6	3.6	5.6

(A. Regular form, B. Functionality and variety design, C. Aesthetic design, D. Easy of accessibility, E. Comfort, F. Loneliness, G. Clean and hygienic, H. Security, I. Technology, J. Active management)

For to question 'How effect do you to green and its tones color in hospital garden?' Participants expressed as color effects on relaxing (46.8%), reminds nature (38.1%), vitality-saving or freshness (13.5%), gives relief (5.6%), provides peace of mind (4.8%), clean air (1.6%), respectively. This result is very important to using plants in gardens. However, Whitehouse et al. [15] proposed that the most effective and preferred color is green and its tones in hospitals. However, they also proposed that blue color has also reducing muscle tension and effects as water power. Moreover, the yellow color reported to be an energetic color. The results found in this study clearly consisted with that information.

Tanriverdi [21] found that majority of hospital visitors prefer to see colored flowering plants (28%) and beautiful leaf form (23%). Hence he proposed that green belt in garden with flowers and leaves of tree and bushes could be created beautiful view. However, the color effects on the specific disease treatment have not been tested enough, although in many developed countries, hospitals were used for psychological ailments'

The participants respond to the questionnaire question of 'What is your most desired plant species?' as follows; they want to most desired plants as; trees (36.4%), herbaceous flowering plants (30.7%), grass (25.8%), shrubs (6.1%), and groundcovers (1.1%), respectively. However, the majority of responders selected plants as the color of flower (26.7%), color of leaf (23.2%), general habitus of plants, (13.5%), smell of leaf and flower (10.5 %), plants size (6.0%), flower form (4.5 %), branching (3.7%), plant texture (3.5 %), color of fruit, trunk and branch (2.2 %) and leaf form (2.2%) and others respectively.

However, the 32% of participants proposed that functional properties of hospital ground should be having a visual value. But, 24% of responders preferred as a shadow effect in ground while 17% preferred it should be changed quality of the air. Moreover 10% of responders preferred dust retention and 9% of them have preferred as reducing the effect of the wind and 8% have preferred it should be erosion prevention, respectively.

It is well known that the trees and plant species have variety of forms and their shapes effects on humans' psychology. They can create a sense of comfort according to personal specifications.

The participants respond the questionnaire question of 'What are your most desired plant forms for you?'. The majority of participants preferred conical (20.3%), columnar (20%), cluster (pendula) (16.1%), globular forms (11.5%), scattered form (8.9%), horizontal form (8,9%), pyramidal (7.2%) and others, respectively.

During face to face interview and questionnaire conduction, some pictures on the general plant composition (Fig. 2) were shown and their impact on those subjects summarized as; 32% of participants preferred in Picture 6 that going-type plant composition while 24% of expressed of Picture 1. Some of participants also preferred Picture 2 (18.7 %), Picture 3 (11.3 %), Picture 4 (8.0%) and Picture 5 (6.0 %), respectively. It is clearly realized that the principle of contradiction is actually kind of diversity and perception shows that materiality as seen in Picture 6 (Fig. 2). Çelem and Şahin [22] proposed that shaped trees particularly scattered pyramidal shaped trees is raises the sense of discipline'

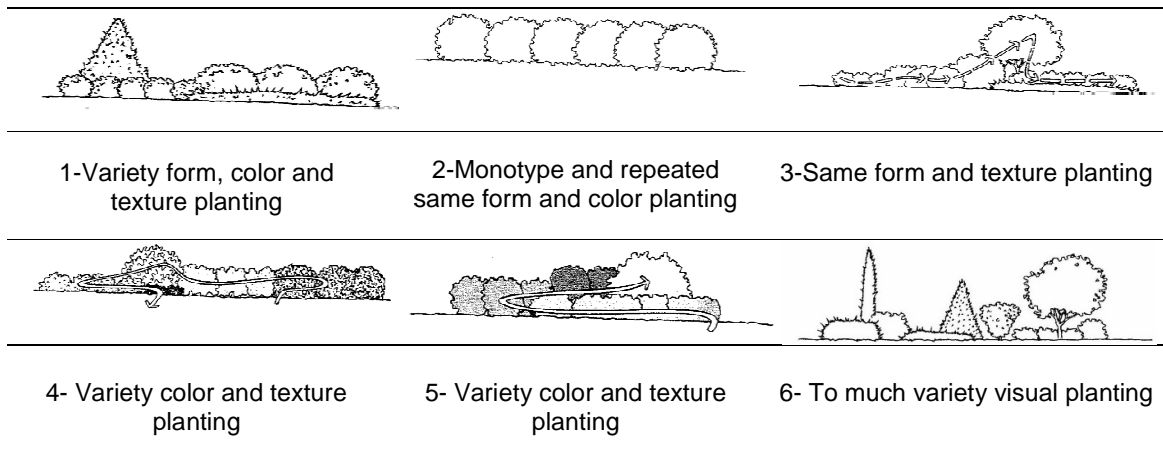


Fig. 2. The type of plant compositions

#### 4. CONCLUSION AND RECOMENDATIONS

It has already proposed many literature findings on hospital gardens with different expectations. This is also a case for in Turkey. Therefore, the research on the subject is quite complicated. In this regard, it is probably best way to determine expectations from hospital gardens is to use face to face survey methods. Hence, different users of hospital garden can be determined and suggestions and expectations can be noticed directly.

The active and passive hospital garden users expect service and versatile during in service. However, it is important to design interior and exterior of hospitals with holistic sense, versatile functionality and succeeded for most of the users. To this end, enhancing the quality of the hospital grounds in the context of the general policy design and landscape approaches and rules can be summarized as follows:

- In the hospital gardens, *evoking nature* should be done with the using concept of a green space. Especially in the garden, green area ratio should be more than hard floors and other facilities.
- It is also useful to establish as hobby gardens, vegetables, fruits, and ornamental plants as well as some cultivation plots and greenhouse areas with the rock and water garden can be helpful and functional to user of hospitals.
- To provide control of light and reflection some herbal materials should be chosen to minimize road dust, noise, wind effects.
- In the hospital's gardens, during eating, drinking, resting allow all user to watch, building, facilities and equipment. But with a particular field that serves users venues can be considered as separate from each other.
- Hospital gardens should be regular and functional for transportation. Users should be provided with access to each field on foot. The walkways should be well designed so all users feel comfortable in garden. Walkways and roads should be well organized and all users easily recognized and some route plans should be posted on appropriate places. In addition, the vegetated areas in hospital garden should have enough distance from walking paths and recreational and living

areas. These distances should be approx. 20-30 m intervals.

- The hospital room's windows should be organized to see garden. So the patient should as much as possible to see garden from rooms' easily.
- In the garden, water pool and spaces rather than vegetable areas should be designed in an appropriate proportion and a scale should be combined with the plant.
- During the night, aesthetic lighting fixtures that can provide a sense of trust and functional features.

#### CONSENT

It is not applicable

#### ETHICAL APPROVAL

It is not applicable.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. Stigsdotter A. Landscape architecture and health. Evidence-based health-promoting design and planning. Doctoral thesis, Swedish University of Agricultural Sciences, Alnarp; 2005.
2. Elings M. People-plant interaction: The physiological, psychological and sociological effects of plants on people. Jan Hassink and Majken van Dijk (eds). Ch. Netherland. 2006;4:43-55.
3. Marcus CC, Barnes M. Gardens in health care facilities: Uses, therapeutic benefits, and design recommendations. Martinez, CA: The Center for Health Care Design; 1995.



4. Tipi CB. Proposal of a method for assessment of the hospitals of medicine faculty within the context of accessibility, usability and user satisfaction, Doctoral thesis, (Turkish, Abstract in English), Gazi University, Natural Science Institute, Ankara; 2007.
5. Tse MMY, Ng JKF, Chung JWY, Wong TKS. The effect of visual stimulation pain threshold and tolerance. *Journal of Clinical Nursing*. 2002;11(4):462-469.
6. Sakıcı Ç, Celik S, Kapucu Ö. Evaluation of landscape designs of hospital gardens in Kastamonu, (Turkish, abstract in English). *SDU Faculty of Forestry Journal*. 2013;14: 64-73.
7. Karakaya B, Kiper T. Investigation of hospital outer space design in Edirne City, (Turkish, Abstract in English). *Journal of Tekirdag Agricultural Faculty*. 2011;8(2): 49-64.
8. Ulrich RS. Effects of gardens on health outcomes: Theory and research. In Cooper-Marcus C, Barnes, (Eds). *Healing Gardens: Therapeutic benefits and design recommendations*. John Wiley & Sons, New York. 1999;27-85.
9. Uslu A, Kiper T, Baris ME. Public health-urban landscaping relationship and user's perceptions. *Biotechnology & Biotechnological Equipment*. 2009;23(3): 1399-1408.
10. Ulrich RS. Effects of healthcare environmental design on medical outcomes, the therapeutic benefits of design. Dilani A, (Ed). *Design & Health*. 2001;49-59.
11. Heerwagen J, Orians GH. The psychological aspects of windows and window design. *Proceed of the 21<sup>st</sup> annual conf. of the env. Design research assoc.* Oklahoma City. 1990;269-280.
12. Ulrich RS. Natural versus urban scenes: Some psychological effects. *Environment and Behavior*. 1981;13:553-556.
13. Ulrich RS. Stress recovery during exposure to natural and urban environments. *J. of Environ. Psych.* 1991; 11:210-230.
14. Sherman SA, Mardelle Mc. S, James WV. Children's environments and health-related quality of life: Evidence informing pediatric healthcare environmental design. *Children, Youth and Environ.* 2005;15(1): 186-223.
15. Whitehouse S, Varni JW, Seid M, Cooper-Marcus C, Ensberg MJ, Jacobs JR, Mehlenbeck RS. Evaluating a children's hospital garden environment. Utilization and consumer satisfaction. *J. of Environ. Psc.* 2001;21:301-314.
16. Sheskin IM. Survey research for geographers. *Association of American Geographers*, Washington; 1985.
17. Anonymous; 2008. Available:<http://www.hastane.com.tr/hastane/egirdir-kemik-eklem-hastaliklari-hastanesi.html>
18. Marcus CC, Barnes M. *Healing gardens: Therapeutic benefits and design recommendations*. John Wiley and Sons, Inc., New York; 1999.
19. Bulut Y, Goktug TH. Healing gardens as an environmental factor to be fit, (Turkish, Abstract in English), GOU. *Ziraat Fakültesi Dergisi*. 2006;23(2):9-15.
20. Brawley E. Raising the bar in designing senior environments. *The 12<sup>th</sup> Annual Affordable Housing Conference*, Spokane, Washington; 2005.
21. Tanrıverdi F. *Peyzaj Mimarlığı bahçe sanatının temel ilkeleri ve uygulama metodları* (Turkish), AÜ. Ziraat Fakültesi Yayını, Erzurum; 2001.
22. Çelem H, Şahin S. Kent içi yol ağaçlarının görsel ve işlevsel etkileri. (Turkish), *Kent Ağaçlandırmaları ve İstanbul 96 Sempozyumu*, İsfalt Yayını: 3, İstanbul, s: 41-54; 1997.

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