

Significance of Daylighting for Drug Addicts in Rehabilitations Centre

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Abstract: *Light is necessary of vision and enables us to sense or perceive our surrounding, in many direct and indirect ways, affecting our physiological and physical health. This study specifies the relationship between daylight and human behaviour. Light effect on human health and performance by allowing visual tasks, body control, mood and perception and critical chemical responses in the body. It also impacts outcomes in healthcare settings by reducing depression among patients, decreasing length of stay in rehabilitations. Daylight appears to be one of the sensual and visual components for the health and wellbeing of patients in the rehabilitation centre and other health care settings. The aim of this paper is to establish the significance of day lighting for drug addict patient wellbeing and healing environment in Rehab and investigate the methods for incorporating daylight in it. The literature study helps to find out the better solution and techniques to bring daylight inside the building and building codes specify the recommended average illuminance levels required in a space; according to the type of function that particular space host. On the other hand, survey of some selected rehabilitation centre reveals that although average illumination levels are within recommended range, the actual level of illumination at individual position in the observed space is too high or too low, i.e. there is large variation in the distribution of lighting in the space. This distribution of light is the outcome by several architectural parameters that can be controlled by an architect at initial design stage. Accordingly, finally design guidelines for Rehabilitation centre for drug addict patients, based on the analysis of finding form the survey and literature review, have been framed to incorporate daylight in the interior spaces considering patients wellbeing and healing environment.*

Keywords: Daylight, Rehabilitation centre, health, Simulation, Design Builder

1. Introduction

In an increasingly urbanized modern context, addictive behavior that is physically and mentally harmful threatens society's emotional and moral stability. Drug abuse and addiction spread like cancer among youth, the number of deaths from drug abuse is increasingly known as a nationwide physical, social and spiritual disease the cause the loss of thought, nervousness and power. Rehabilitation is facilitation method designed to improve the capacity of individuals whose problem exclude or have caused society to exclude them from engaging in elements of life in the mainstream and in everyday operations in line with their aspirations. Ancient civilization understood the critical importance of daylight associated with human health, happiness and wellbeing. The importance of the beneficial therapeutic effects of daylight and sunlight reached new levels of understanding with the treatment of drug addicts (Strong, 2012). Light effect on human health and performance by allowing visual tasks, body control, mood and perception and critical chemical responses in the body. Light impacts outcomes in healthcare settings by reducing depression among patients, decreasing length of stay in rehabilitations and hospitals. This study focused on the significances of daylight for drug addicts and daylight integration methods in the rehabilitation centre.

Rehabilitation is treatment or treatments intended to facilitate the recovery process from injury, illness, addictions such as drugs, alcohol, smoking or disease to a situation as normal as possible. The purpose of rehabilitation is to restore some or all the physical, mental and sensory capacity of patients who have been lost owing to injury, illness and addictions. Rehabilitation includes evaluating patients in order to compensate for difficulties that cannot be medically reversed. Drug Rehabilitation is the method of clinical or psycho-therapeutic care of psychoactive

substances like alcohol, prescription drugs and street drugs. These are residential centres that provide standardized and intensive care 24 hours a day, including safe housing and medical care. Residential treatment facilities can use a variety of therapeutic methods, and they are usually intended to help the patient maintain after recovery a drug-free, crime-free lifestyle.

Day lighting is an important environmental factor that helps patients enhances their recovery rates for mental well-being. Seasonal affective disorder is a mood disorder and related to seasonal variation of light. It is caused by a biochemical imbalance in the hypothalamus due to the shortening of daylight hours and the lack of sunlight in winter (lighting analysis, 2017). Disorientation of building rooms may be so dark that people can suffer from insufficient daylight. It will be useful to spend time outdoors during the day or to arrange Patients room and activities area to obtain more sunlight. The presence of daylight in buildings should maximize the potential of architectural form while optimisms human comfort and visual perception. Natural light is a tangible architectural tool that can underline the shape of building, emphasizing its geometry, its spatiality, accentuating or something contradicting its structure, disclosing the properties of the materials, the textures it is made of (Altomonte, 2008).

It can be a practical and lyrical means to provide orientation, focus, hierarchy, movement along the path and it could be related to the mind or spiritual forces of life. Daylight can define and manipulate the spaces of a built environment, marking the boundary or uncovering the link between inside and outside and separating or connecting internal spaces (Altomonte 2008).

Light is critical to human functioning because it enables us

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to see stuff and Activities. But it is also essential because it psychologically impacts on human beings.

- Enable visual duties to be performed
- Affecting mood, perceptions and reducing depression
- Facilitating direct absorption for critical chemical reactions within the body.
- Impact of Day-lighting on physical disease.

Day-lighting, the technique that optimizes the use of natural light to illuminate interior, is becoming popular not only for its ability to dramatically transform a room, but also for its natural healing powers. The impacts of light on the psychological disease are due to light incident on the retina of the eyes causing modification of individual endocrine, hormone and metabolic state (JORDER, 2009). When light passes through the eye, the Main visual areas, and also the parts of the brain responsible for hormonal regulations, are signalled. Visible radiations involving the whole of the physical and physiological aspects that inform of the body and the mind about the characteristics of the surrounding environment and contribute to the biological metabolism of the human organism (Altomonte, 2008). Increasing the production of vitamin D, controls the hormones such as serotonin, dopamine, cortisol and improved calcium intake in the intestine (Altomonte 2008).

Daylight plays a significant role in providing illumination in the healthcare facility depending on the opening windows, fenestration and orientation of the building. It is to build a healing environment and human comfort in the rehabilitation centre. From the above review a majority of the researchers' analysis the importance of daylight in resident of rehab because daylight is essential for patients as they spent almost time in rooms and restricted area, so it is beneficial to their psychological and physical conditions and effects of daylight on human body starting from psychological impact and then link it with physical and psychological recover in rehabilitation centre. It can help to reduce the patient's length of stay in rehab, fast recovery, reduce requirements for pain relief and depressive illness and disinfections. Day-lighting through windows can comprehensively meet the entire visual, non-visual and perceptual needs of people living and working in built environment, clearly illuminating the task as well as the internal spaces and providing the necessary conditions for health and well-being. In healthcare settings, natural light should be incorporated into the building design, not only because it is beneficial to patients and staff, but also because daylight having a healing power, no price.

2. Study Area

National Drug Dependence Treatment Centre is located in Kamla Nehru nagar, Ghaziabad, NCR Delhi is considered as a study. It is situated at 26.9124°N and 75.7873°E, referring to geographic co-ordinates Ghaziabad has influenced tropical climate. The temperature during the summer months varies between 32°C to 45°C and 20°C to 6°C during the winters. On an average, Lucknow receives 101 cm of annual rainfall. It becomes humid after September and sometimes the temperatures may escalate due to the humidity.

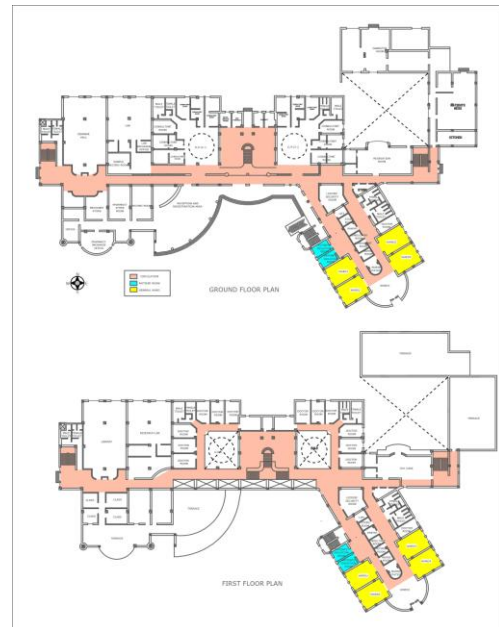


Figure 1: Floor plans of national drug dependence treatment centre

Source: - Author

NDDTC is one of the largest drug addict treatment centre in India. has played a leadership role in the country and has worked on development of various replicable models of care, training of post-graduate psychiatry students and health professionals, development of resource materials and research and Providing clinical care and rehab care of inpatients and out Patients community based – through daily OPD, specialty clinics, ward and community clinics. Spread across 10 acres, almost 70% of the site is used for landscaping and surrounded by green belts. The research centre includes a drug research centre and drug rehabilitation centre. It has 50 beds capacity for in-patients and 150 out patients and 20 doctors, 20 nurses and 20 security guards.

3. Methodology

A multi-method approach used in this study, data collection of the building, on-site measurements were conducted to investigate, on-site measurement of daylight illuminance level and evaluate the daylight conditions in patient rooms in general wards at national drug dependence treatment centre (NDDTC).

4. Method

A multi-method approach used in this study, building data collection, on-site measurement of daylight illuminance level and patient rooms, simulation with the help of design builder software and evaluate the daylight conditions in patient rooms in general wards at national drug dependence treatment centre (NDDTC).

a) On – site measurement

The dimensions of the general wards are (8×6×4) m its capacity is 6 – 4 beds, 4 window in each wards and those windows are located in south-west and north-east. The isolation patient room are (5 x 3.2) M; capacity is 1-2 beds, 2 windows are located in south-west direction, the Internal

level of illumination in the patient's room and wards was measured at bed level is 0.9 meter. Each point is located in the centre of each bed; open all windows, blinds and turn of all artificial lights.

The Lux meter is used to measure indoors illuminance in the patient's bed of the general ward and patient isolation room. Measurement was taken October 2019. The daylight illuminance value was taken to be more reliable as described in table 1. The CAD (computer aided design) software was used to model the design of the patient room and wards.

b) Simulation



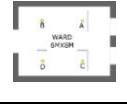
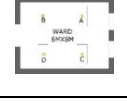
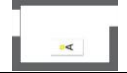


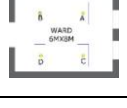
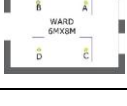

The select of design builder software to simulate the level of daylight illumination at the National Drug Dependence Treatment Centre building. Loading building data and weather data on the site in the design builder software has

updated the site. Which is provided by the city coordinates along with the elevation. Design of software scale models in design, building to check the luminance levels of patient's room and wards then extract the illuminance at the given spaces. The simulation was done in three interval of a day 21june, 21 January at 9 am, 12noon and 5pm. The daylight illuminance value was taken to be more reliable as described in table 2.

5. Data Analysis

Comparative analyses were conducted for site measurements of the current situation, and the recommended values. The Internal level of illumination in the patient's room and wards was measured at bed level is 0.9 meter. Each point is located in the centre of the patient's bed as shown in table 2.

Table 1: Analysis of daylight illuminance level at the Patients bed in the given spaces

Name of Room/ Ward	Space Layout	Daylight Position	Window Orientation	recommended illuminance values (lux)	Daylight (Lux) At 9 A.M	Daylight (Lux) At 12 Noon	Daylight (Lux) At 5 Pm
A. General wards on Ground floor							
ward 1		Point – A Point – B Point – C Point - D	South West	(100 – 1000) lux	645 32 400 80	1992 53 931 178	354 34 330 75
ward 2		Point – A Point – B Point – C Point - D	South West	(100 – 1000) lux	350 123 300 80	705 202 416 149	342 176 306 115
ward 3		Point – A Point – B Point – C Point - D	North East	(100 – 1000) lux	22 20 32 25	20 15 25 12	11 13 7 9
ward 4		Point – A Point – B Point – C Point - D	North East	(100 – 1000) lux	12 9 20 16	7 11 12 10	5 5 9 7
B. Isolation Patience Room – Ground floor							
Patient room 1		Point A	South West	(100 – 1000) lux	169	239	244
C. General wards on Ground floor							
Ward 1		Point – A Point – B Point – C Point - D	South West	(100 – 1000) lux	450 69 484 80	1200 127 997 172	1154 70 416 91
Ward2		Point – A Point – B Point – C Point - D	South West	(100 – 1000) lux	460 88 350 130	1222 127 1064 172	1200 70 589 91
Ward 4		Point – A Point – B Point – C Point - D	North East	(100 – 1000) lux	30 16 28 16	23 14 24 12	14 9 15 12
Ward 5		Point – A Point – B Point – C Point - D	North East	(100 – 1000) lux	24 14 27 18	18 10 24 14	11 9 9 9
D. General wards on First floor							
Patient room 2		Point -A	South West	(100 – 1000) lux	239	340	194

Source: Author

The simulation was done in three interval of a day 21 June & 21 January at 9 am, 12 noon and 5 pm. The recommended level of illumination in a patient room is 100 lux for general lighting and 300 lux for general lighting. Lecture (CIBSE, 2002). The differences are between 48 Lux to 4,847 lux,

which means that there is unevenness. Lighting values in the room as a whole, depending on the Time and depth for each point in the room. The range of adequate daylight is (100-300) lux, bearable light is (300 – 500) lux and after crossing the 1000 lux range, the glare produced in the spaces.

Table 2: Analysis of daylight illuminance level at given spaces

Name of Room/ Floor & window orientation	Space Layout	Daylight (Lux) At 9 A.M	Daylight (Lux) At 12 Noon	Daylight (Lux) At 5 Pm	Daylight (Lux) At 9 A.M	Daylight (Lux) At 12 Noon	Daylight (Lux) At 5 Pm
		Summer (June)			Winter(January)		
General ward Ground floor South-west orientation of window							
General ward Ground floor North-east orientation of window							
General ward First floor North-east orientation of window							
General ward Ground floor South-west orientation of window							
General ward First floor North-east orientation of window							

Source: Simulation from design builder 2019

6. Result

The indoor study was evaluated and analyzed Quality of daylight at general ward & patients in National drug dependence treatment centre (NDDTC). These are the Performed by conducting two approach Including on-site measurements of illuminance and simulation on design builder software. According to the result of the simulation of the wards and the patients' room. The southwest-facing rooms and wards, with more daylight exposure throughout the year, but also in summer daylight, create a glare and then fall directly into the patient's beds, feel uncomfortable and move towards the other side of the room to share other patients' beds in a certain period of summer. The window of the patient's room is located on the south-west side of the room in the corner where the light spreads well throughout the room and reduces the amount of glare, but the wards windows are centrally located in the centre where the light comes directly to the patients' beds and a large amount of glare is produced. The north east oriented ward has good light in the morning but very low daylight in the morning especially in the winters (9-24) lux but needs (100-800) lux according to the recommended values of daylight. The result of the simulation concludes that the orientation of the rooms, wards and windows of the room is incorrect and that there are no shading devices, glare control material, reflector technology.

7. Conclusion

This study explored the importance of daylight in rehabilitation centre especially for composite climate of India and its impact on rehab patient mood, perception, satisfaction and stress. The designing of rehabilitation centre fall into the category of spaces where the quality of Daylight Increasing the production of vitamin D, controls the hormones such as serotonin, dopamine, cortisol and effect of light on psychological illness are due to occurrence of light on the retina of the eye causing change in the individual hormone and metabolic. Orient patients' room to maximize early morning sun exposure provide high levels of lighting for complex visual task. The design of building is based on patient activities that should suit the mental and psychological state of the patients. Between northwest and north east is the most suitable orientation for treatment and operating room. For nursing façade, south to south-East favors pleasant morning sun, low heat built-up and low sun shading requirements mild at night. The location of the windows should also take account the relationship between the outside view and the occupants eye level. Because through the window patients get sunlight and outside view of the nature which is reduce their depression. Unpleasant feeling of enclosure was minimal with a window width of at least 1.5 meters. The ideal was two lateral windows with a total width of 3-4 meters in a 6m wide room. If patients were

exposed to 2500 lux for 2 hours in the morning for ten day periods, their agitation reduces.

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