

Caring For The Aged Through Sustainable Design

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Abstract : The aged are a neglected lot in our country. A lot of work needs to be done for this group to mitigate their problems in their day to day life. This can be done through sustainable design but the design has to be customised suiting each and every person individually. Ergonomics need to play greater part in helping the aged when the Architects & Interior designers design any space. Presently the elderly are excluded from many using certain space or items for the design not being a universal one. Special care need to be taken in their homes as they spend 90% of their time in their there. With the children mobile and living out of country the urban class have the elderly living all alone fending for themselves in homes not equipped for them. The elderly living alone thus is in grave peril as their health, welfare & safety is not safeguarded. This is due to the fact that mostly people when they get their homes designed forget that they too will become old & infirm and forget to take steps to prepare for the certain eventuality. Thus Architects, Designers have a social responsibility to make every space barrier free and thus help the elders to lead a life taking care of themselves with pride and painlessly.

Introduction

It is the responsibility of the Architect & the Interior Designer to design spaces ergonomically accessible to every human being so that the function of the form & space for which it has been designed reaches its full potential.

Every aged have a different capabilities in terms of their sensory, physical or cognitive abilities which along with their varied habits and experience and their adherence to their tradition and culture make then a unique entity. The elderly are usually seen to be in a perpetual denial that they have grown old and hence usually reject products especially designed for the elderly. The aged want to continue using the products which are designed for all and find the concept of graduating to products for the old to be abhorrent. Hence the need of the hour is to make the designs universal, barrier free & accessible to all.

The impairments of the aged too are varied and wide ranging. Some of them are fortunate to have just mild aches and pains, while others are afflicted with severe arthritis, gout, lumbago and osteoporosis. Most of the elderly in India suffer with Diabetes and high blood pressure or heart diseases which could vary from heart attacks to strokes. Cancer is among the most heart wrenching disease that any human has to face which could be more than 100 different types and are usually incurable at old age as sustaining surgery or chemo or radiation therapy after certain age is nearly impossible. Alzheimer's, Dementia, loss of hearing or vision, Parkinsons disease, depression & sleep disorders form the broad spectrum



of physical problems which the aged face. These diseases are to be medically treated but some of the problems like the arthritis, osteoporosis, lumbago, etc can be taken care of by the designers with a little care and ergonomically.

Once old age sets in a gamut of problems set in along with the orthopaedic problems. They have lowered stimulation of senses of visual, hearing and even olfactory, hence prefer brighter lights, colours and louder sound.

The elderly usually get very territorial, once they mark something as their own, they would never part with it. They favour repetitive actions to novelty. Their cognitive ability too diminishes and so, the aged prefer their known environment.

Methodology

The methodology adopted here is aimed at substantiating the hypothesis that the anthropometry of the individual user especially in the aged group is the only solution to mitigate the physical ailments of the user with problems of back ache, shoulder pain or knee & ankle pain. The steps that have been followed are :

Case Studies :

Three case studies have been picked from similar economic and cultural background from urban upper middle class families. The emphasis have been put on the bed as the study where in all the three persons had a severe problem in the morning getting up from their beds. Here the age group are of senior people with different physical structure and sex.

Studies conducted in the next two steps are conducted in respect to their physical comfort of the users are under two different parameters , e.g.

2.2 the beds which have been designed following the empirical design standards and as expected, not very ergonomically friendly as the user became older

2.3 the beds which were designed or altered matching the altered physical structures of the end users at their old age.

Thus the users of the above mentioned three case studies have been taken from real life projects in which the clients have a very varied capabilities, professional and physical characteristics are : (i) Mrs H, Mani Rao, in her middle 60s, a tall and stately lady, primarily a home maker living in Jubilee Hills, Hyderabad. (ii) Late Mr Ajit Bose, an octogenarian, retired engineer who was living in the residential area of Ameerpet, Hyderabad, and (iii) Mr Ajay Bose, a practising Architect in his middle 60s living in the residential area of Ameerpet, Hyderabad.

Observations

While designing the bedrooms for the senior citizens the following were observed which subsequently led to the design of the bed :

Change in the physical structure in the elderly: The major reasons in the change in the physical structures of the aged and subsequent physical problems can be attributed to the following :

1. Osteoporosis is a condition in which the strength of the bones decreases and increases the risk of breaking. This also gives rise to acute pains as the grip weakens along with

1. their torque.
2. When the joints are affected with osteoporosis, gout, bursitis, etc becomes very painful and interferes with the movement. The knee is the prime joint where the deterioration is seen the most and the aged more often than not needs to go for a knee replacement surgery.
3. the ankle joint which bears the total weight of a human body is another area where the effects of the joint related problems are seen. This condition is termed as Achilles Tendonitis, whereby, the condition is caused by gout , bursitis, etc. since these tendons connects the muscles to the bone located at the back of the lower leg, any problem arising gives rise to acute pain in the ankle which usually spreads upwards to the calf muscle and to the knee.
4. the lumbago pain or the lower back pain which is often caused by slip discs, overweight and mostly through mechanical problems which leads to in-flammation and pain. This is very commonly seen in the 80% of the seniors.
5. the frozen shoulder symptoms are again a very common ailment seen in the elderly. Even small jobs like combing one's own hair too becomes a Himalayan task.

Ergonomic design of the bed : choice of parameters

General Ergonomics deals with anthropometric dimensions of the primary user. Here for a bed design the average Indian male or female height will not work as we are dealing with the aged with special requirements. The anthropometric dimensions of the body parts , specially the dimensions from the popliteal to the heel is usually between 335 to 540 with a mean of 426 in males and 305 to 455 with a mean of 399 in females. The combined mean is 420. The problem arises when the finished height of the bed along with a 150 mattress available in the market is around 410 to 450. This exerts a lot of pressure on the lower back when the person sits on the bed and on the shoulders as well as the knee & ankle when the person wants to stand up. The user needs to heave oneself up with the support of the hands which takes a toll on the shoulders which are already painful.

Hence as the height of the of a sitting surface is dependent on the measurement of the height of the popliteal of an individual, hence variable and the finished height of every bed too shall be user centric.

Dr Debkumar Chakrabarti defines the popliteal in the book Indian Anthropometric Dimensions : the Popliteal is the angle point at the underside of the thigh immediately behind the knee where the tendon of the biceps femoris muscle inserts into the lower leg.

Organizational Ergonomics

This deals with a whole gamut of works where the relation of form with the user is not only paramount, but also for the safety and well being of the user. Proper organization of the work flow and circulation in an enclosed space - as small as a bedroom negates the repetitive actions which is detrimental to the health of the elderly. The elderly people needs to have all their requirements near at hand and hence we need to organize them into proper zones – Primary zones which is within the reach of the persons while on the bed where the user can store the most frequently used items, Secondary zone where the user needs to walk



a few steps to acquire the required item – usually items which they need less frequently, and the tertiary zone where the user is to store rarely used items.

Cognitive Ergonomics

This constitutes one of the most important parameters while designing for the aged as their memory power diminishes, their cognitive ability too diminishes and they usually respond to their sub-conscious memory and perception. The actions taken by any human being actually is in response to their perception and occurs in a split second. Hence care is taken to design the space without sharp corners, non-slippery floors, etc.

Validation of the Hypothesis

Three projects have been selected as case studies to prove the point :

Case Study I – Mr Ajit Kumar Bose’s bed alteration : when late Mr Ajit K. Bose had developed hernia with acute complications after his surgery, he developed severe problem in leaving his bed even to visit the toilet. At the same time he being in his 80s was not willing to give up his bed & the mattress which he was using for the last 40 years. A study of his anthropometric dimensions were done and the height of the bed was raised bit by bit. The bed height was found to be 460 which also is the height of a chair. For the chairs the arm rest acts as a grab bar to pull oneself up, whereas on the bed the user has to depend on his arms to heave himself up. This exerted a lot of pressure on the painful frozen shoulders of Mr Bose. His popliteal height was 428 but even then he was unable to get up without any assistance. Bit by bit we added the height checking each time his comfort zone which finally got fixed to 560 which incidently was the height of the region between the popliteal & the gluteal furrow. Hence the height of the bed was finally fixed at 560 where his toes would touch the floor and the octogenarian could actually slide gently out of the bed directly on the floor without having to trouble his painful shoulders. This alleviated his problems of his having to call for help each time he needed to get up from the bed.

Case Study II – Mrs H. Mani Rao a resident of Jubilee Hills, Hyderabad, in the brief had stated about her slip disc and acute backache resulting in sciatica nerves problem which led to Achilles Tendonitis. Aged around 55 years then, was in great difficulty in the mornings while getting up from the bed. We had, from the beginning, taken her measurements had designed her bed suiting her dimensions. Mrs Rao being taller than average Indian women at 1778mm had her popliteal measurement at 453mm. While experimenting with her in reality again the height of the bed when taken up at 560 helped her to get up from her bed with agility. Her gluteal furrow as at 829 from the finished floor level. So, a soft top vertical spring orthopaedic mattress over horizontal spring in a steel frame was inserted over a plywood platform and a head board was added to the bed frame for aesthetics. Past seven years the lady has been greatly relieved as she has very little dis-comfort while getting up from the bed in the morning.

Case Study III : Architect Ajay Bose, aged 65years, had been suffering from a very rare spine problem called the Spina bifida, where exists a crack in the spine, lateral in nature. The spinal

cord at times slips into the crack. The pressure exerted on the cord by the spine is highly debilitating and excruciating pain ensues which had given rise to sciatica problem and had caused numbness in his thigh. T as per the advice of the orthopaedic surgeon, he had always used a 50mm thick cotton mattress over a flat bed where the total height of the bed was 560 . But as, his discomfort increased and a change in the bed design was perceived. Here a 230mm vertical spring mattress with a soft top with memory foam was introduced. Past five years, Mr Bose has had no complaints about the previous problem.

Discussion

Generally the height of a seat or a bed correspond to the average dimensions of the popliteal as that supports the knee and gives a purchase to the foot on the ground. But while designing, it was seen that if the user gently slid down the bed and gets up in one go, the pressure on the shoulders, lumber or even the heel. This could vary from person to person with variable age. When younger, people usually go for very low level bed which could be as low as 200 to 300. But as old age sets in, we find the common ailments sets in and the aged try to find solutions for the same. It has also been seen that people with lesser means, even insert bricks below the leg of their bed to raise it to their comfort level.

Conclusion

In my Design Practice, I had the opportunity to help a number of aged to over-come their problems. I have, with the Ergonomically designed bed and other furniture & the organizational ergonomics as well as cognitive ergonomics been able to solve a multitude of the problems which my clients were facing. My intention was to ascertain how to grow old in the same space without any problem or extra help and I have taken 3 of my clients to prove the fact.

I have tried to establish how a retired person without severe impairment or restricted movement can live alone taking care of their own day to day work with pride. These days we find that the elderly want to live in the much known environment of their neighborhood and their own homes rather than shifting with their children to an alien place without their extended family and friends, and having to adapt to the new culture surmounting the language barrier and having to make new friends.

The job of the Interior Designer is just not to design interiors which are contemporary in style or visually pleasing, but to design a space which is functional, sustainable, unified and gives a feeling of wellbeing to the end users. The materials used should be sustainable as well as GREEN, and the space should be aesthetically pleasing to live in. This synergy when achieved makes the experience of the user holistic and a harmonious. The designers need to understand the age related issues in every sphere of life – the changes which comes to one's life at different stages - psychological, physical as well as social which are to be anticipated, and create a better environment for the "older adults".

The parameters of design sought viable solutions to educate the Architects, Designers as well as the manufacturers about how and why there was a need to concentrate on the aged in the present scenario.

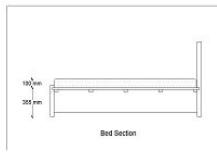


Fig 1



Fig 2



Fig 3

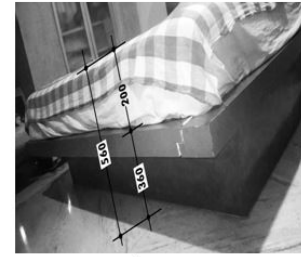


Fig 4

Fig 1 Showing the empirical standards of a bed

Fig 2 Case study 1 where we had raised the bed height with plywood 19mm thickness x 5 pieces

Fig 3 Case study 2 where the spring mattress have been inset into the wooden box frame

Fig 4 Case study 3 where the height has been raised by introducing a 200mm thick spring mattress

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