Sitting Habit and Posture Investigation of Office Employees in Nigeria

Onawumi A. Samuel

Department of Mechanical Engineering. Ladoke Akintola University of Technology Ogbomoso, Nigeria. ayodele.onawumi@covenantuniversity.edu.ng +234 803 666 9825

ABSTRACT

Sitting is widely acceptable posture for various office works in spite of its attendant health hazards especially in situation when inappropriate chair with misfit and poor features is used. This study investigates the sitting habit of office workers as well as assesses their postural discipline in relation with workplace design. A randomly selected sample size of 250 male and 150 female employees from four work centres in forty-five different locations of five commercial hubs were used. The result of the analysis of data from structured questionnaire administered and the anthropometric data of the respondent show the level of mismatch that exists between employee characteristics and office furniture especially the chair and how it impacts on the sitting posture of worker in offices visited. Workers sitting habit were observed to have strong association with risk factors such as type and nature of the office work, micro-ergonomics of facility arrangement of the workplace and duration of the work activities. This suggests that premium attention should be focus on reengineering of seat system in Nigeria.

Key words: Posture, Sitting habit, Risk factor, Micro-ergonomics, Seat System.

INTRODUCTION

Office activities have gone through vivid advancements with the introduction of computer integrated facility (CIF), machines, calculators and other electronic gadgets. This in turn has increase the risk exposure of office employee in modern times. Sitting habit of office worker has huge influence on how healthy and productive they would be at work. This habit covers areas like duration of work that was done while sitting, posture assume in the office, chair design and job type [1], [2]. The type of chair used also depends on the operation carried out by the worker, likewise table are of various structural dimensions and characteristics [3], [4], [5]. Chair and associated furniture are commonly found in many workplaces among which are offices. Offices can be defined as a room or building used for business or clerical work [6] and [7]. Chair, desks, table, upholstery and other specialized furniture which holds computer system, telephone box, printer, copier, fax machine mail tray, books and files for easy accessibility of the users. The nature of varieties of job carried out in typical workplace calls for careful consideration of the design, and arrangement of the facilities in it [8]. It is observed that employer of labour in any developing countries have considered furniture having adjustable features for comfort as luxury for which there is no fund to accommodate. Hence the reason for frequent occurrence of injuries and regular disengagement of week and seek workers from job [16, 17 and 18].

The idea of office ergonomics was premised on human capabilities in relation to the design specifications required for development of user friendly man-machine system that is profuse

with computer and other electrical and electronic gadgets. These challenges coupled with the prolong static posture and high visual demands results in many of the occupational hazards such as work-related musculoskeletal disorder (WRMD), fatigue, ill-health from job stresses, poor performance and frequent breakdown of equipment, machines and work system [9, 10]. Work related injuries are found in virtually every workplace though varied both in type and degree of impact on human operator/user of the work system. Noise, vision and hearing problems are also common with many workplaces. In recent times efforts are focused on design and fabrication of ergonomic chair, adjustable furniture and user friendly machine tool commonly used in office environment. This has the high potent of helping the employee to avoid awkward posture and better performance in relation to job and tool requirements [11], [12].

Sitting requires the muscles to hold the trunk, neck and shoulder in a fixed position for a long period which lead to the swizzing of muscles and its attendant hitch of blood supply which could result in fatigue. CCOHS [13] reported that when a person is seated the spine should maintain its natural S shape and also ensure the lumber is properly supported.

Health hazard and complaints associated with sitting at work originates from bad, repeated postural fixity of the worker or from the use of misfit chair with inappropriate dimensions. Triano [14] suggested the guidelines for sitting in an office chair as follows:

1) Your elbow should be at 90^{o} when you sit comfortably and as close as possible to your desk. Your upper arm should be parallel to your arm resting on your work surface. If not move your chair up or down.
2) The space between your thigh and the leading edge of your chair should be wide enough to take only one finger. If it is too tight, an adjustable footrest is needed. If otherwise, raise the chair.
3) While sitting with your buttock against the chair back, you should be able to pass your clenched first between the back of your calf and the front of your chair. If you cannot do this easily, it means the chair is too deep. Therefore, you would need to adjust the backrest forward, insert a rolled up towel at the back or get a new office chair.
4) There should be a cushion or lumber support at your lower back area while your sit with your buttocks pressed against the back of your chair in order to minimize the strain on your back.

This study is set out to investigate the sitting posture of office workers and the impact of different types of seat on comfort, performance, effectiveness, efficiency and safety of the workers [15]. In effect the fitness of the existing office chairs to human body physiology was assessed. Anthropometric data of the workers under study were collected in relation to appropriate to sitting posture in the office.

MATERIALS AND METHODS

Sample size of four hundred respondents consisting of three hundred males and one hundred females were randomly selected from four work centres at civil service offices, cooperate business offices, business centres, and departmental offices in higher institutions Forty-five different locations in five commercial hubs in southwestern Nigeria were considered. The subjects were of the ages 18 – 60years found in sixty-five offices within the geopolitical zone covered in this study.

Personal Data

Demographics of the subjects such as age, sex and ethnic group were collected along with job designation. Other information gathered was on the work environmental condition and

comfort level of employee seat. The structure questionnaire also touches on work related musculoskeletal problem experienced by the subjects.

Seat Comfort

The impact of seat used by the employee was assessed based on the level of comfort provided by seat system design. Also the characteristic of the seat as well as the time variant accumulation work related trauma were investigated with the instrument of personal interview and questionnaire.

Office Operation

Participatory intervention approach was employed in the collection of necessary information. Also personal interview, observation and reporting of notable office activities, arrangement and its work system design were considered using the instrument of structured questionnaire for the offices visited.

Anthropometric Data

The anthropometric variables of a sample of four hundred (250 males and 150 females) were collected and characterized. Twelve body dimensions relating to office work posture including weight were measured using stadiometer, anthropometric seat, small and large wooden venire calliper, tape rule, weighing scale, clipboard, measurement form, and digital camera, As a result of the level of technicality of the data collection five enumerators including three males and two females were trained on the method positioning subjects in correct sitting posture, use of the instruments of the study including recoding and questionnaire administration. Triplicate measurements of the selected linear variables were taken to enhance the reliability of the measuring instrument and method adopted. The linear measurements were taken in centimetre while the weight and age were measured in kilogram(kg) and years (yr) respectively.

Results and Discussions

Office works considered in this study were male dominated with about sixty percent being men. This gender bias was supported by the high rate of literacy among men which limits females by cultural discrimination especially in the developing and under-developed world. Fifty-four percent of the respondents were in their middle age of 35years followed by the thirty percent who were of age 45years. This suggest that office work requires matured mind-set and experience which most employers looks for during interview for employment of people into various positions in the civil services and other office based jobs. Also noticed was that about fifty percent of the respondents were at the middle and higher managerial positions which depict that most of the office works are for knowledge workers who needed a comfortable working environment for optimum performance which include ergonomically suitable seat and workplace design (Figure 1). As a result of the work demand of the office job most activities are carried out in sitting position (Figure 2).

However, the posture each worker assumes consciously or unconsciously is determined by a number of factors some of which were investigated in this work and presented in the following sections. Table 1 shows that eighty-four percent of the respondents work during the day between 8am and 4pm which may be considered as morning shift where shift operations are being observed. This suggests that higher human performance in knowledge and sedative jobs can be achieved during the day rather than in the night period.

Table 2 and 3 inform that about fifty percent of the respondents work for eight hours in sitting position with the exception of the regular one-hour break time which about eighty-seven percent do observe. This response agrees with labour law that makes provision for

work rest regulation and which was observed to contributes significantly to productivity of workers in a work system.

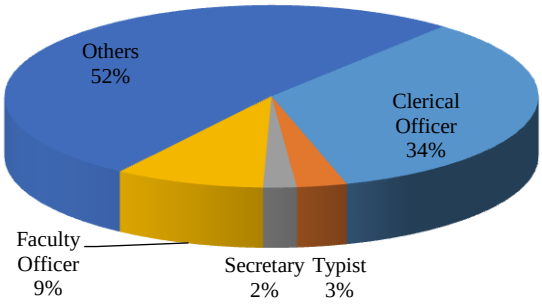

Figure 1: Job Designation

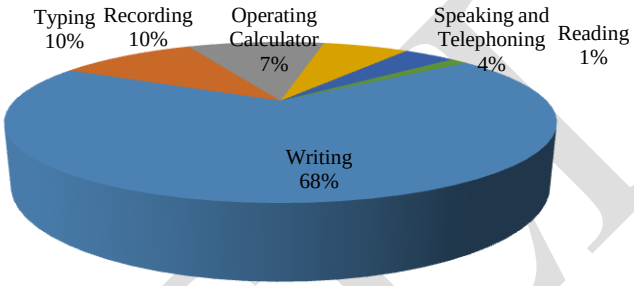

Figure 2: Categories of Office work

Table 1: Working Hours

Hour	n	%
8am-4pm	328	83.7
8am-5pm	60	15.3
8am-2pm	4	1.0

Table 2: Time spent in sitting position

Time	N	%
8hr	192	49.5
7hr	40	10.3
6hr	84	21.7
5hr	56	14.4
4hr	16	4.1

Table 3: Observe Rest Period

Response	n	%
Yes	344	86.9
No	52	13.1

Seat Design and Users' Comfort

Table 4 shows the responds of the subjects to questions on the design as well as the comfort derived from the seat used on the offices in relation to seat armrest availability and height adjustability. It was observed that about 95% of the seats were locally fabricated by indigenous furniture makers most of who are artisans with qualifications not more than technical certificate in carpentry. About four-fifth of the seats were observed to be non-adjustable which invariably do not provide facility for adjustment of the seat features particularly the seat height to fit the user. While 32% of the respondent indicated that they are comfortable using their seat even without the adjustment feature, about fifty-seven percent were just okay with the design of the seat as it is. This response suggest that a good number of the fabricators have possibly develop them self to understand the demands of users' limitations and build that into the design of furniture. It is not also impossible that those that indicated that it is just okay have only force themselves to adapt to the seat though it's design is poor. Similarly, the effect of absence of armrest is noticed as respondents using seats that has no armrest are of the view that the design is poor and not friendly. However, only about thirty percent of the seats have no armrest. Among the users of seats that has armrest only 20% were comfortable with the use of their seat. This strongly suggests that the fabricators do not have the knowledge of ergonomics of furniture. Table 5 indicates the specifics on the defects of the seat design features according to the opinion of the users. Major complaint on the seat was that the seat width is small and that the backrest is too straight. This could be responsible for the major complaint of physical discomfort at the lower back and the neck and shoulder of the users as shown in Figure 3. It was noticeable that almost 50 percent of the respondents do not consider any of the listed complaint as impactful possibly because they have adjusted themselves to the defects of the seat.

Table 4: Seat Design and level of Comfortability

	Chair				Armrest			
Comfortability level	Adjustable		Not Adjustable		Available		Not Available	
	n	%	n	%	n	%	n	%
Comfortable	32	5.0	32	1.0	48	17.0	12	1.0
Just Okay	28	44.0	224	67.0	188	68.0	64	55.0
Not Comfortable	4	6.0	72	22.0	40	15.0	40	35.0
No Response	0	0	4	1.0	0	0	0	0
Total	64	16.0	332	84.0	276	7.0	116	29.0

Sitting Habit and Musculoskeletal disorder

The observed sitting manner of the workers were recorded with use of digital camera and interpreted as shown in table 6. Forty-four percent of the respondents conform to bad sitting posture by sitting on the front edge of rear of the chair. The interview of the respondent revealed that the design of their chair is what informed their sitting posture the consequence of which is the lower back pain and other form of musculoskeletal disorder distributed through the four identifiable extreme link system namely: head and neck, upper extreme link, the thoracic and lower extreme link systems of the respondents. Table 7 shows that about seventy-eight percent of the user do not use foot rest. It was observed that no footrest was provided with the writing

Table 5: Employee Complaint about the Seat

Complaints	n	%
Seat too High	8	2.0
Backrest too Straight	56	14.1
Seat too Deep	28	7.1
Seat Not wide enough	80	20.2
Backrest too wide	8	2.0
Armrest too high	24	6.1
No Complaint	192	48.5

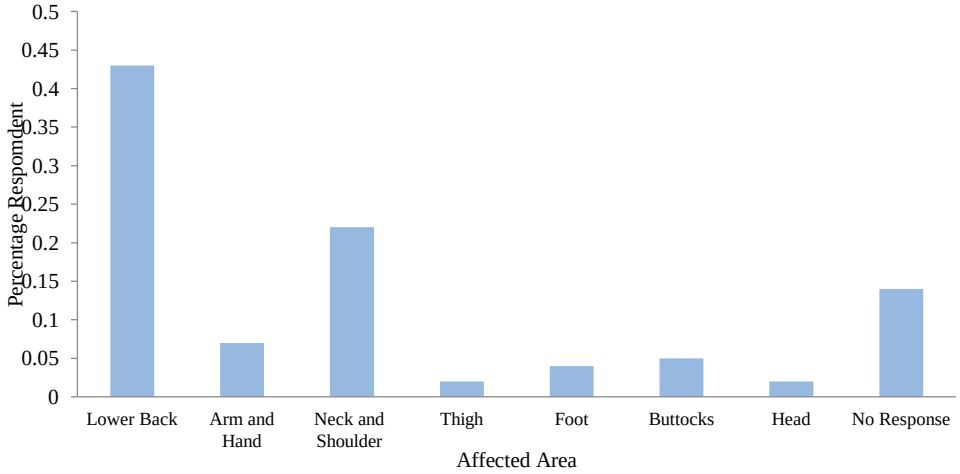

Figure 3: Area of discomfort on user's musculoskeletal system

table or seat used. Local furniture makers were not informed on the function and needs of footrest hence it is usually an add-on to office furniture simply on special request.

Table 6: Seating Habit

Area where Seated on Chair	n	%
Sitting on the front Edge of the Chair	144	36.0
Seating on the centre of the chair	220	56.0
Seating at the rear of the chair	32	8.0

Table 7: Use of Footrest

Use	n	%
Always Use footrest	32	8.0
Sometime Used	32	8.0
Not at all	308	78.0
No response	24	6.0

5th and 95th Percentile of the respondents

Table 8 and 9 show the percentile values (5th, 50th and 95th) of anthropometric data for twelve different body dimensions of male and female respondents including the weight measured in kilograms.

Table 9: Anthropometric Measurement of Male Subjects

Anthropometric Measurement (cm) (N=250)	Male			
	Percentiles			SD
	5th	50th	95th	
Weight (kg)	49.97	70.00	84.94	9.38
Sitting Height Erect	79.79	84.99	88.89	4.02
Sitting Shoulder Height	54.69	60.00	64.90	4.45
Lumber Height	19.99	27.69	33.97	3.55
Sitting elbow Height	15.00	20.00	24.00	2.20
Thigh Clearance Height	9.79	12.69	17.95	1.79
Sitting knee Height	51.99	58.19	61.93	2.48
Sitting popliteal Height	40.99	45.00	49.00	2.66
Buttock-popliteal depth sitting	46.09	50.39	57.92	3.98
Buttock-knee depth sitting	55.58	62.69	68.87	3.34
Elbow-to-elbow length	40.20	45.49	54.93	4.11
Hip Breadth Sitting	31.29	36.50	41.16	2.52

NB: all dimensions except the weight are in centimetres

Table 10: Anthropometric Measurement of Female Subjects

Anthropometric Measurement (cm) (N=150)	Female			
	Percentiles			SD
	5th	50th	95th	
Weight	48.99	67.96	107.30	10.2
Sitting Height Erect	74.97	82.20	86.55	3.54
Sitting Shoulder Height	51.28	57.17	63.31	4.22
Lumber Height	17.99	27.49	31.25	4.00
Sitting elbow Height	13.00	20.00	24.00	3.01
Thigh Clearance Height	10.29	15.50	20.03	1.40
Sitting knee Height	51.00	56.00	59.00	2.33
Sitting popliteal Height	38.00	41.99	48.12	2.50
Buttock-popliteal depth sitting	44.49	48.20	53.65	3.21
Buttock-knee depth sitting	54.35	60.08	65.66	3.13
Elbow-to-elbow length	37.77	46.27	61.18	3.70
Hip Breadth Sitting	31.99	38.69	43.24	2.21

NB: all dimensions except the weight are in centimetres

There is significant difference between dimensions of male and that of female. These data could be used in the design of seat feature like seat height, seat depth, backrest plane height, backrest height, armrest clearance, lumber supports and armrest surface rest etc. of the workers. Design problem which is closely related to particular body dimension can be attended to adequately where there is a reliable anthropometric data of furniture users' population. For the purpose of design for adjustability data on the standard deviation is found very useful.

CONCLUSIONS

This study has established the level of mismatch that exists between office furniture especially the chair and how it impacts on the sitting posture of worker in offices visited. Low level of education of furniture makers has contributed negatively to the product of their activities. It is evident that most of the users and the furniture makers do not have knowledge about ergonomics hence the force fitting to whatever is provided as table and chair in the offices. Workable threshold limit value (TLV) must be determined by design to fit employee

in the organization. The nature of work office environment does not constrain gender in getting employment thus require that furniture provided for use of staff be made adjustable and easy to use for both sex. Complaints and evidences of discomfort are noticed in offices as office workers are seen to develop varying sitting postures in anticipation of a comfortable sitting condition. Defects in the design of chairs and seating system were noticed with the consequence that they imposed on the innocent users. The idea of considering office furniture with adjustability feature should be rejected and appropriate authority should rise to the demands of worker in relation to seat design and comfort at workplaces. It also necessary to suggest to government at various levels to organize seminars, training and workshops to educated both the populace and furniture makers and importer of both office and home furniture on the applications of ergonomics in the design of they produce and use. Appropriate legislation should establish and enforced particularly on items that are imported into the country.

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