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Preliminary statistical analysis of anthropometrics data in related to sitting posture among college students at east coast Malaysia

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ABSTRACT

Purpose: To statistically analyse sitting posture using anthropometrics data among college students in Malaysia.

Design/methodology/approach: This study was conducted among 52 college students consisting of males and females. Data were analysed using a common statistical tool which is the Statistical Package of Sosial Science (SPSS).

Findings: Preliminary analysis of data indicated that there are wider differences in standard deviation of eye sitting height compared to the previous study conducted.

Research limitations/implications: This study was conducted at only one higher learning institution/college located at East Cost of Malaysia.

Practical implications: The larger value of standard deviation discovered as statistical analysis performed using combined data among male and female participants suggested that data should be segregated.

Originality/value: Result obtained could be used as a preliminary guideline to design any related item in related to sitting posture.

Keywords: Sitting posture, Anthropometrics data, Human health

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BIOMEDICAL AND DENTAL MATERIALS AND ENGINEERING

1. Introduction

Numerous studies have been made to establish an anthropometrics database of various population groups in order to ensure and guide end products to be ergonomically designed to fit the specific population [1]. The group population differences in physical anthropometrics sizes are obvious among nations, e.g., "if a piece of equipment was designed to fit 90% of the male U.S. population, it would fit roughly 90% of Germans, 80% of Frenchmen, 65% of Italians, 45% of Japanese, 25% of Thai, and 10% of Vietnamese" [2]. This is known as important as different populations having different body sizes. Chair design and innovation range from simple to sophisticated, depending on the usage, e.g. therapy chair to improve trunk control [3]. It is noted by previous research that there is a relationship between chronic lower back pain and sitting behaviour [4]. In another research, tactile feedback does not result in substantial differences in sitting performance and musculoskeletal discomfort among office employees [5]. Ergonomics illness is noted as related to poor facilities designed [6]. Other researcher acknowledged that under certain circumstances, environment and production process cause occupational diseases and other negative consequences in the working environment [7]. As limited statistical anthropometrics database available in Malaysia regarding specific populations [8], it is, therefore, the objective of this paper is to analyse anthropometrics data among college students in order to establish preliminary database for beneficial future use to design and develop a laboratory chair with the right sitting position. The result of this study could also be applied to any sitting posture-related concerns as nowadays there are tendacy to increase theoretical learning in low-income countries [9], and this is in line with Covid-19 pandemic situation where students normally spend most of their time sitting while performing online learning. In order to achieve the objective of this study, sufficient anthropometrics data are required to be analysed. 13 body dimensions were considered among 52 college students who were respectively invited to participate in this study.

2. Methodology

In order to carry out this experiment, an experimental flow chart was developed (Fig. 1). As mentioned previously, this study was conducted among 52 college students consisting of 26 males and 26 females. Consideration of combining male and female students was due to this method required to implement at the design stage to equipment in related to sitting posture e.g. chair [10]. The participants involved in this study were among college students at east coast of Malaysia aged ranging from 17 to 25 years old with dominant age of 17 to 19 years old, representing 62% and 73% of male and female participants, respectively. To be statistically accepted, it is commonly known that the data required should consist of a minimum of 30 samples [11]. Data were analysed using the common statistical tool, which is the Statistical Package of Social Science (SPSS).

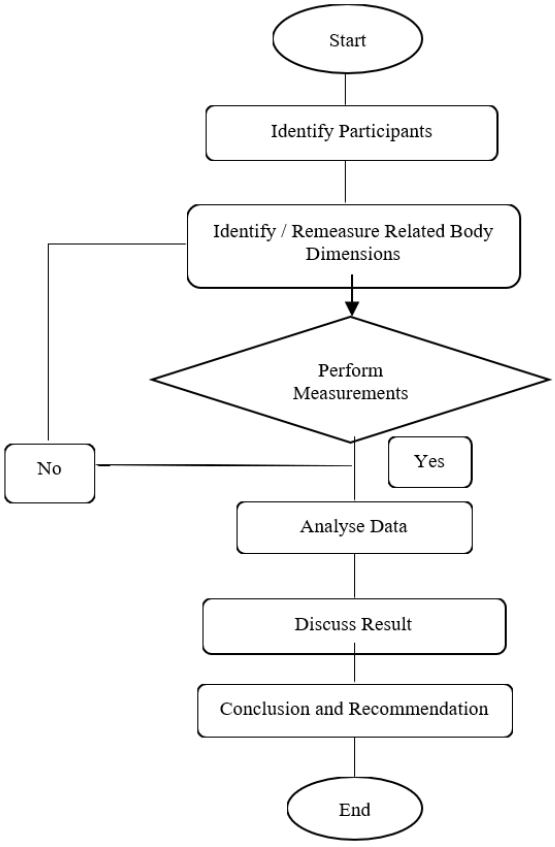

Fig. 1. Experimental flow chart

The main components of this research consist of collecting and analysing data on 13 body dimensions related to sitting posture, as in Figure 2 below. There were 1 – stature (body height), 2 – sitting height, 3 – shoulder height sitting , 4 – lower leg length (popliteal height), 5 – hip breadth sitting , 6 – elbow height sitting, 7 – buttock-popliteal length (seat depth), 8 – buttock-knee length, 9 – thigh clearance, 10 – eye height, sitting, 11 – shoulder breadth, 12 – knee height and 13 – body mass (weight). All dimensions except for the body weight are related to sitting posture which was measured in cm.

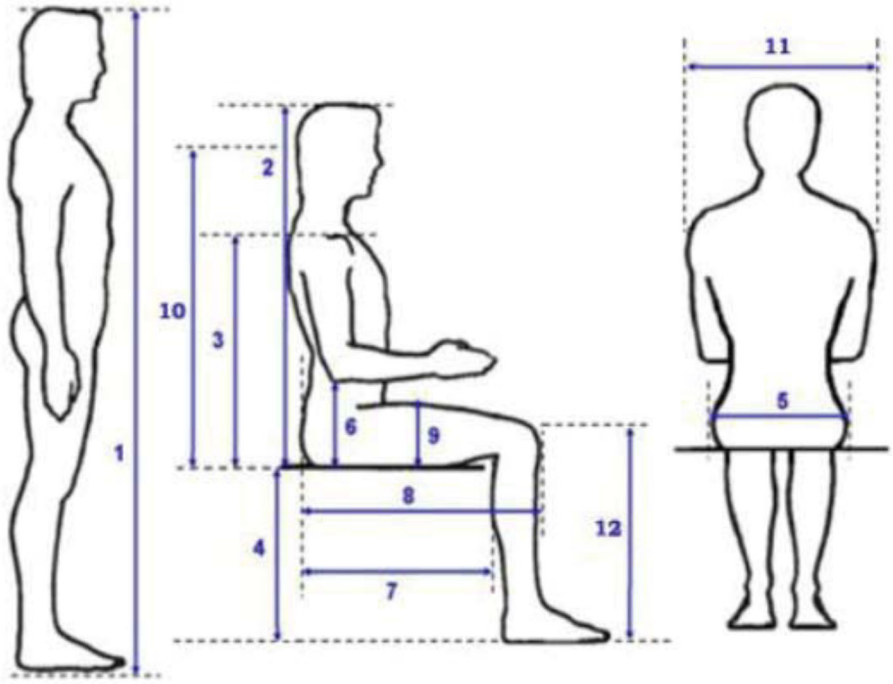

Fig. 2. Body dimensions in related to sitting postureCollected dimension would be recorded accordingly. Except for stature height (1) and body weight (13), all dimensions noted are generally related to sitting posture [12]

Table 1.
Anthropometric Data for n= 52 Participants

No	Dimensions, cm	Mean	Median	Std. deviation	Min	Max	Percentiles		
							5	50	95
1	Stature (body height)	161.1	161.0	8.8	146.0	187.0	147.3	161.0	176.8
2	Sitting height	80.8	81.0	4.4	73.0	90.0	74.0	81.0	89.0
3	Shoulder height, sitting	53.7	53.0	5.3	44.0	64.0	45.3	53.0	64.0
4	Lower leg length (popliteal height)	44.4	45.5	*3.1*	38.0	56.0	39.7	45.5	48.0
5	Hip breadth, sitting	38.2	37.0	6.9	30.0	77.0	30.7	37.0	48.1
6	Elbow height, sitting	20.1	19.0	7.3	15.0	67.0	15.0	19.0	26.8
7	Buttock-popliteal length (seat depth)	43.2	43.0	3.7	36.0	51.0	37.3	43.0	50.4
8	Buttock-knee length	53.0	53.5	3.8	46.0	64.0	46.0	53.5	59.4
9	Thigh clearance	13.5	13.0	3.1	8.0	23.0	9.0	13.0	19.0
10	Eye height, sitting	67.9	69.0	*10.2*	28.0	99.0	48.2	69.0	77.4
11	Shoulder breadth	42.4	41.0	4.2	36.0	52.0	36.0	41.0	50.4
12	Knee height	51.3	51.0	6.1	23.0	62.0	45.0	51.0	60.7
13	Body mass (weight), kg	60.0	54.5	16.3	38.4	110.0	40.7	54.5.0	100.9

3. Result and discussion

All measured dimensions were recorded in Table 1. From the data recorded, it was noted that the highest and the lowest standard deviation which related to sitting posture were sitting eye height and lower leg length (popliteal height) respectively. The reading obtained was 10.2 cm and 3.1 cm. Compared to research previously conducted related

to the same dimension taken, the result of the highest and the lowest value were noted varies [13]. E.g., eye height sitting and lower leg length (popliteal height) for male was 4.3 cm and 4.4 cm and for female was 5.1 cm and 3.4 cm. The differences may be due to the later data included a wider range of data collection among different races, e.g. Filipinos, Malaysian and Indonesians and also separated data analysis into males and females. The other factor was on age range from 18 to 45 years old. The differences in general were not obvious in leg length (popliteal height) as recorded at 3.1 cm, 4.4 cm and 3.4 cm accordingly. However, the obvious standard deviation differences were noted larger on sitting eye height dimension where in this research noted at 10.2 cm versus at 4.3 and 5.1 by previous researcher. Generally, the larger standard deviation in this paper resulted mainly due to less number of participants being considered;, secondly, male and female participants being grouped together.

4. Conclusion and recommendation

As comparison data was performed, further improvement and analysis of this research should be implemented in a few areas. The first one is to separate data analysis into two groups, male and female, of which each group should consist minimum of 30 participants respectively. This research should also consider on applying more advance statistical analysis, such as including analysis of the t-test, so that significant differences among the group could be identified.

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Additional information

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