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Body composition and cardiorespiratory fitness of Indian online delivery executives

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ABSTRACT

Objectives: Online delivery executives (DEs) have become the spine of the e-commerce delivery industry because of the doorstep delivery of commodities. The present study evaluates the body composition parameters and cardiorespiratory fitness (expressed in terms of VO_{2max}) of online DEs.

Materials and Methods: The study entails 42 online food DEs, 41 goods DE and 29 rapid DEs as experimental groups. 39 employees from the clerical sections of IT companies were also recruited as a sedentary control group (CG). The body composition parameters of the subjects endorsed their body density (BD), total body fat (TBF), %body fat (%BF), lean body mass (LBM) and percentage of LBM (%LBM), respectively. For statistical analysis, one-way analysis of variance followed by Bonferroni's *post hoc* analysis was implemented. Pearson's correlation statistics unveiled that significant relationships exist between relative and absolute VO_{2max} and body composition parameters in the studied groups, accompanying which simple and multiple linear regression analyses were also implemented to predict the regression norms of VO_{2max} from various body composition parameters.

Results: Significant differences were observed between the experimental and CG in terms of body weight, body mass index, resting heart rate, systolic and diastolic blood pressure (DBP), VO_{2max}, sum of skinfolds, BD, TBF, %BF and %LBM, respectively. Intra-group variations were also evident in terms of DBP, absolute VO_{2max} and sum of skinfolds amongst the experimental groups.

Conclusion: It was inferred that online DEs had better body composition and cardiorespiratory fitness than CG on account of their manual handling protocols.

Keywords: Aerobic capacity, Body composition, Cardiorespiratory fitness, Physical activity

INTRODUCTION

The concept of online lifestyle has indeed proved to be a boon for this era. Apart from offering a broader domain of exclusive features and applications, it has increased our comfort in a way that today, in a single click, the daily essentials are available at our doorsteps. Behind the huge popularity and success of the sector lies the exceptional diligence of online delivery executives (DEs). However, the DEs are often exposed to job protocols such as frequent lifting of heavy loads, abnormal postural adaptations, which might significantly impact their overall health status.[1] DEs belonging to both food and non-food sectors are interfused with considerable amounts of physical activities, including navigation of various terrains, climbing up and down the stairs, carrying loads of different weights, etc., which make their job designs extremely physically demanding.[2] Gig workers specifically involved in the delivery of consignments or food, witness extremely high amounts of physical activity involving lifting/carrying items, walking, running for considerably extended periods, etc.[3] Bicycle courier protocols provide a cardio workout, substantially catering as a mode of full-body exercise for the entire day, often leading to the burning of extremely high amounts of fat.[4] Moreover, workload challenges significantly increase mental stress and influence the autonomic modulation of heart rate (HR) and blood pressure (BP). Greater workloads lead to decreased HR variability (HRV) and increased HR and BP, thereby inducing the activation of the sympathetic nervous system and potential risks to the cardiovascular system.[5] Intense physical activities might augment profound impacts on the body composition and cardiorespiratory fitness of online DEs. The present study is aimed at evaluating the body composition parameters and their influence on cardiorespiratory fitness (VO_{2max}) of online delivery executives.

MATERIALS AND METHODS

Sample size calculation

PS Power and Sample Size Calculation version 2.1.30 was used for the calculation of sample size, which uses the Dupont and Plummer formula.[6] The outcome variable, which was used for the estimation of sample size, was VO_{2max}. The α (level of significance) was set at 0.05 (95%), and the power at 0.8 (80%), δ (difference in population means), σ (within-group standard deviation) and m (control to experimental ratio) were 10.4, 9.35 and 0.96, respectively. The estimated sample size was 14, and considering a dropout of 20%, the final sample size was calculated to be 17.[7] To be safe-sided, 17 subjects from each group were considered for the study.

Selection of subjects

From across various parts of Kolkata, West Bengal, the online DEs (n = 112) (Food DEs or FDE [n = 42] [age = 25.24 ± 0.32 years], Goods DEs or DE [n = 41] [age = 25.59 ± 0.23 years] and Rapid DEs or RDE [n = 29] [age = 24.69 ± 0.46 years]) were recruited. In addition, as a sedentary control group or CG (n = 39) (age = 25.51 ± 0.43 years), subjects were recruited from esteemed IT companies from their clerical sections. Recruitment of the DEs was done by stratified random sampling, which involved dividing them into subgroups and selecting them randomly for data collection by a lottery system. The inclusion criteria for the participants involved a uniform age range of 20–30 years, uniform socioeconomic background, presenting no signs and symptoms of co-morbidities, having no past medical history and possessing complete abstinence from addiction of any forms. To ensure uniformity of socioeconomic background, the modified Kuppuswamy Scale was used, which considers several objective metrics such as family income levels, occupational and educational standards.[8] Informed consents were obtained from participants before the study commencement. The study was conducted adhering to the guidelines of the Declaration of Helsinki 1975 (revised in 2000). The ethical approval of the study was obtained from the Human Research Ethics Committee, Department of Physiology, University of Calcutta (Ref No. CUIEC/02/04/2023-2024 dated 1 March 2024). For designing and reporting the data and findings of the study, the STROBE guidelines have been considered.

Preparation of subjects

The subjects were asked to take rest for half an hour soon after reporting the venue, in the course of which estimations of the resting physiological and physical parameters were done by an anthropometer and a weighing machine having an accuracy of ±0.5 cm and ±0.5 kg. The ages of the subjects were obtained from their respective Aadhaar cards issued by the Indian Government. By means of a sphygmomanometer, the resting BP was determined, and from the carotid artery of the subjects, the resting HR was estimated. On the day of assessment, the BP of each participant was estimated twice intermittently at an interval of 3–4 min before exercising. They were comfortably made to sit with proper back support, feet placed flat on the floor and arms at the heart level. The cuff of the sphygmomanometer was placed on bare skin above the elbow level. From the height and weight of the subjects, using the standard formula, body surface area (BSA) and body mass index (BMI) were derived.[9,10] Simultaneously, the test protocols infused with the study were explained to them.

Determination of body composition of the subjects

The respective skinfold measurements of the participants were taken using a Skinfold calliper (Holtain Ltd., UK) for estimating the different body composition parameters pertaining to the following equations:

- Body density or BD (g/cc) = 1.10938–0.0008267 (X1) + 0.0000016 $(X1)^2$ –0.0002574 (X2)[11] (Where: X1 = Sum of chest, abdominal and mid-thigh skinfolds and X2 = Age in nearest years)
- %Body fat or %fat = (495/BD)–450.[12]

Subsequently, calculations of the total body fat (TBF) or fat mass (FM), percentage of lean body mass (%LBM) and lean body mass (LBM) were performed adhering to the standardised equations:

- TBF or FM (kg) = (%fat/100) × Body weight (kg)
- %LBM (%) = 100–%fat
- LBM (kg) = Body mass (kg)–FM (kg).

Determination of cardiorespiratory fitness of the subjects

Cardiorespiratory fitness (VO_{2max}) of the subjects was estimated using the Queen's College Step Test (QCT).[13] Before exercise, the subjects were asked to rest for a duration of 10 min. Then, at a rate of 24 cycles/min (96 beats/min), they were instructed to step up and step down on a 16.25 inches stepping stool for 3 min and concomitantly, for maintaining the stepping cadence, a metronome was used. After completion of the exercise, they were asked to stop immediately, and for 15 s (i.e., from the 6^{th} to 20^{th} s of the first recovery minute), the recovery pulse count was estimated with the help of a stopwatch. From the recovery pulses, the VO_{2max} was computed using the formula:

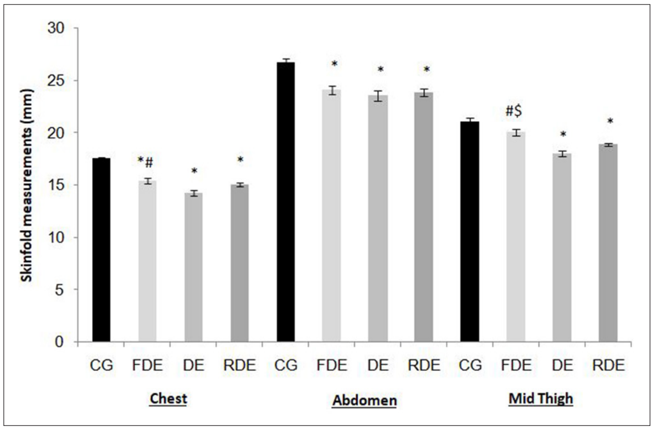

Figure 1: Skinfold measurements of the studied groups. CG: Control group, FDE: Food delivery executives, DE: Goods delivery executives, RDE: Rapid delivery executives (*Significant at $P < 0.05$ when compared to the control group, #Significant at $P < 0.05$ when compared between FDE and DE group, $Significant at $P < 0.05$ when compared between FDE and RDE group).

- VO_{2max} (mL/kg/min) = 111.33 - 0.42 × Recovery heart rate in beats/min

Statistical analysis of the data

Data were expressed in terms of mean ± standard error. One-way analysis of variance (ANOVA), accompanied by Bonferroni's *post hoc* analysis, was implemented to account for the differences existing in terms of mean values of the considered parameters. In addition to this, Pearson's correlation coefficient was also implemented to contemplate the relationships evident between VO_{2max} and body composition parameters. Simple and multiple linear regression analyses with reference to the same were also performed for analysing the prediction norms of VO_{2max}

Table 1: General parameters of the subjects.

Parameters	CG (*n*=39)	FDE (*n*=42)	DE (*n*=41)	RDE (*n*=29)
Age (years)	25.51±0.43	25.24±0.32	25.59±0.23	24.69±0.46
Body Height (cm)	168.84±0.79	169.48±0.92	171.41±0.75	169.51±0.80
Body Weight (kg)	66.67±0.7	62.64±1.14*	63.85±0.53*	62.24±±0.86*
BMI (kg/m2)	23.37±0.13	21.74±0.24*	21.74±0.15*	21.65±0.22*
BSA (m2)	1.83±0.01	1.79±0.02	1.82±0.01	1.78±0.02
Resting heart rate (beats/minute)	82.51±0.88	77.52±0.89*	76±1.05*	76.62±1.08*
Blood pressure (mmHg)				
SBP (mmHg)	127.23±0.75	123.81±1.0*	123.56±0.88*	122.97±0.75*
DBP (mmHg)	86.97±0.86	79.14±0.82*$	81.32±0.77*	82.35±0.73*
QCT heart rate (beats/min)	168.31±1.22	159.14±2.30*	154.93±1.96*	158.62±1.38*

Data were expressed in mean±SE, BMI: Body mass index, BSA: Body surface area, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, QCT: Queen's college step test, CG: Control group, FDE: Food delivery executives, DE: Goods delivery executives, RDE: Rapid delivery executives (*Significant at $P<0.05$ when compared to the control group, $Significant at $P<0.05$ when compared between FDE and RDE group)

Table 2: Body composition parameters of the subjects.

Body composition parameters	CG (*n*=39)	FDE (*n*=42)	DE (*n*=41)	RDE (*n*=29)
Sum of skinfolds (mm)	65.25±0.57	59.46±0.65*#	56.47±0.67*	57.67±0.56*
Body density (g/cc)	1.06±0.0004	1.06±0.001*	1.061±0.0004*	1.061±0.0004*
TBF (kg)	12.6±0.19	10.86±0.3*	10.63±0.16*	10.39±0.2*
%BF	18.88±0.17	17.24±0.2*	16.64±0.19*	16.68±0.18*
LBM (kg)	54.07±0.55	51.78±0.87	53.22±0.43	51.85±0.7
% LBM	81.12±0.17	82.76±0.2*	83.36±0.19*	83.32±0.18*

Data were expressed in Mean±SE, TBF: Total body fat, %BF: %Body fat, LBM: Lean body mass, %LBM: %Lean body mass, CG: Control group, FDE: Food delivery executives, DE: Goods delivery executives, RDE: Rapid delivery executives (*Significant at $P<0.05$ when compared to the control group, #Significant at $P<0.05$ when compared between the FDE and DE group) from the significantly correlated body composition variables. The entire statistical analysis of the data was performed in Microsoft Excel version 2007, and the level of significance was set at ($P < 0.05$).

RESULTS

Table 1 enumerates the general parameters of the subjects. Figure 1 represents skinfold measurements of the subjects belonging to the studied groups. The VO_{2max} of the subjects has been presented in Table 2.

ANOVA coined significant differences in terms of body weight, BMI, resting HR and resting BP (systolic BP [SBP] and diastolic BP [DBP]) between the experimental and control groups. Intra-group variations were also observed in terms of DBP between FDE and RDE. The skinfold measurements of the subjects displayed significant differences between the experimental and CG as well. Intra-group variations were also evident in terms of chest skinfolds amongst FDE and DE, and mid-thigh skinfolds amongst FDE and DE, FDE and RDE, respectively. Table 2 represents the body composition parameters of the subjects. With reference to the body composition parameters, intra-group variations were observed between FDE and DE in terms of sum of skinfolds. Table 3 enumerates the absolute and relative VO_{2max} of the studied groups. For the same, significant differences were remarked between the experimental and control groups. Intra-group variations in terms of absolute VO_{2max} were also evident, specifically between FDE and DE. Table 4 represents the correlation coefficients between absolute and relative VO_{2max} and body composition parameters determined using Pearson's correlation statistics.

Table 5 illustrates the regression equations derived using simple linear regression analysis of the significantly correlated variables.

Table 6 elucidates the multiple regression norms for VO_{2max} prediction obtained from the significantly correlated body composition parameters.

Table 3: $VO_{2\,max}$ of the studied groups.

Groups	$VO_{2\,max}$	
	L/min	mL/kg/min
CG (*n*=39)	2.71±0.04	40.64±0.51
FDE (*n*=42)	2.75±0.04#	44.49±0.97*
DE (*n*=41)	2.95±0.05*	46.26±0.82*
RDE (*n*=29)	2.78±0.04	44.71±0.58*

Data were expressed in mean±SE, CG: Control group, FDE: Food delivery executives, DE: Goods delivery executives, RDE: Rapid delivery executives (*Significant at P<0.05 when compared to the control group, #Significant at P<0.05 when compared between FDE and DE group)

DISCUSSION

The present study thus depicted the body composition and cardiorespiratory fitness of online DEs alongside the relationship existent between the same.

In terms of general parameters, significant differences were observed between the experimental and CG in terms of body weight, BMI, resting HR and BP (SBP and DBP). With regards to the body weight of the subjects, CG displayed significantly higher values than FDE, DE, and RDE which can be attributed to pertinent literature enunciating that IT employees witness weight gain substantially because of the deficiency of physical

Table 4: Correlation between $VO_{2\,max}$ and body composition parameters of the studied groups.

Parameters	$VO_{2\,max}$							
	L/min				mL/kg/min			
	CG (*n*=39)	FDE (*n*=42)	DE (*n*=41)	RDE (*n*=29)	CG (*n*=39)	FDE (*n*=42)	DE (*n*=41)	RDE (*n*=29)
Age (years)	0.05	−0.05	−0.05	−0.2	0.18	−0.31*	−0.20	−0.24
Body Height (cm)	0.53*	0.47*	0.92	0.59*	−0.13	−0.36*	−0.23	−0.05
Body Weight (kg)	0.52*	0.18	0.24	0.61*	−0.28	−0.71*	−0.24	−0.34
BMI (kg/m^2)	0.09	−0.15	0.16	0.3	−0.32*	−0.8*	−0.01	−0.41*
BSA (m^2)	0.54*	0.29	0.19	0.66*	−0.22	−0.62*	−0.26	−0.25
Sum of skinfolds (mm)	0.36	0.15	−0.41*	−0.22	−0.10	−0.65	−0.49	−0.59*
BD (g/cc)	−0.15	0.22	0.37*	0.26	0.52	0.65*	0.47*	0.58*
TBF (kg)	0.47*	0.04	−0.14	0.28	−0.2	−0.75*	−0.47*	−0.56*
% BF	0.15	−0.22	−0.37*	−0.26	−0.05	−0.65*	0.47*	−0.58*
LBM (kg)	0.49*	0.23	0.34	0.67*	−0.28	−0.67*	−0.12	−0.25
% LBM	−0.15	0.22	0.37*	0.26	0.05	0.65*	0.47*	0.58*

BMI: Body mass index, BSA: Body surface area, BD: Body density, TBF: Total body fat, %BF: %body fat, LBM: Lean body mass, %LBM: %Lean body mass, CG: Control group, FDE=Food delivery executives, DE: Goods delivery executives, RDE: Rapid delivery executives (*Significant at P<0.05) activities in their job designs.[14] BMI estimations of the subjects unveiled that experimental groups possessed significantly lower values of it than CG, which is attributable to relevant literature deriving the importance of low physical job demands and sedentary work, which ascend the central obesity risk factors in sedentary male workers.[15] In terms of resting HR, significantly higher values were observed in CG than experimental groups. In adults, lower HRV and higher HR are profusely linked to greater sedentary behaviour, which caters as a stipulation for dysregulation of cardiac autonomic balance.[16] In terms of QCT HR, the experimental groups displayed significantly lower values than CG. Workers infused with heavy manual handling protocols tend to possess more agile cardiovascular responses to HRV by dint of their intense occupational activities.[17]

Determination of BP of the subjects revealed that both SBP and DBP were significantly higher in CG than experimental groups, which can be corroborated by similar observations of the past expressing that occupational sedentary workers reported an increased risk of hypertension by regulating blood sugar and cholesterol levels and Quality of Life in modest amounts.[18] Significant intra-group variation was observed in terms of DBP between FDE and RDE, which can be justified by pertinent inferences stating that greater mental workload and stress in RDE lead to greater sympathetic activation and consequently lead to increased peripheral resistance and a rise in DBP.[19]

In terms of skinfold measurements, significantly higher values were observed in terms of chest, abdominal and mid-thigh skinfolds in CG. Intra-group variations were evident in terms of chest and mid-thigh skinfolds between FDE and DE, and FDE and RDE, respectively. Individuals infused with intense physical activity work protocols have lower skinfolds, subsequently exhibiting lower body fat since performing physical activities during manual work augments the burning of calories and reduces the storage of fat in various parts of the body, inclusive of subcutaneous fat depositions, the estimations of which are done by skinfolds.[20]

Based on body composition parameters, significant differences were observed between the experimental groups and CG in terms of the sum of skinfolds, BD, TBF, %BF and %LBM, respectively. Significant intra-group variation was also observed in terms of the sum of skinfolds between FDE and DE. In terms of BD, significantly higher values were observed in the experimental groups than CG. Manual handling protocols facilitate the growth of muscles by means of reducing %BF, simultaneously manifesting in increased density of overall body composition.[21] In terms of TBF and %BF, significantly higher values were observed in CG than FDE, DE and RDE. As per a previous research, it is evident that higher physical activity magnitudes result in a lowering of TBF and subsequently impart a calorie-deficient physiological condition, which consequentially results in lower body fat in experimental groups. Evidence encapsulated from previous research also indicated that higher levels of physical activity increase %LBM because of

Table 5: Regression equations of $VO_{2\,max}$ and body composition parameters for the studied groups.

Parameter	Group	Regression equation
$VO_{2\,max}$ (L/min)	CG	$VO_{2\,max}$=0.026 (BH)−1.66
	FDE	$VO_{2\,max}$=0.02 (BH)−0.83
	RDE	$VO_{2\,max}$=0.03 (BH)−2.49
	CG	$VO_{2\,max}$=0.03 (BW)+0.8
	RDE	$VO_{2\,max}$=0.03 (BW)+0.89
	CG	$VO_{2\,max}$=1.57 (BSA)−0.06
	RDE	$VO_{2\,max}$=1.89 (BSA)−0.47
	DE	$VO_{2\,max}$=−0.03 (Sum of skinfolds)+4.72
	DE	$VO_{2\,max}$=44.61 (BD)−44.37
	CG	$VO_{2\,max}$=0.1 (TBF)+1.51
	DE	$VO_{2\,max}$=−0.1 (%BF)+4.64
	CG	$VO_{2\,max}$=0.04 (LBM)+0.84
	RDE	$VO_{2\,max}$=0.04(LBM)+0.65
	DE	$VO_{2\,max}$=0.1(%LBM)-5.51
$VO_{2\,max}$ (mL/kg/min)	FDE	$VO_{2\,max}$=−0.95(Age)+68.4
	FDE	$VO_{2\,max}$=−0.38(BH)+109.12
	FDE	$VO_{2\,max}$=−0.6 (BW)+81.93
	CG	$VO_{2\,max}$=−1.24 (BMI)+69.52
	FDE	$VO_{2\,max}$=−3.15 (BMI)+113.03
	RDE	$VO_{2\,max}$=−1.09 (BMI)+68.36
	FDE	$VO_{2\,max}$=−30.85(BSA)+97.6
	RDE	$VO_{2\,max}$=−0.60 (Sum of skinfolds)+79.45
	FDE	$VO_{2\,max}$=1399.74 (BD)−1438.42
	DE	$VO_{2\,max}$=898.29 (BD)−906.63
	RDE	$VO_{2\,max}$=813.97 (BD)−818.66
	FDE	$VO_{2\,max}$=−2.43 (TBF)+70.92
	DE	$VO_{2\,max}$=−2.4 (TBF)+71.77
	RDE	$VO_{2\,max}$=−1.59 (TBF)+61.21
	FDE	$VO_{2\,max}$=−3.17 (%BF)+99.16
	DE	$VO_{2\,max}$=−2.04 (%BF)+80.23
	RDE	$VO_{2\,max}$=−1.85 (%BF)+75.52
	FDE	$VO_{2\,max}$=−0.75 (LBM)+83.33
	FDE	$VO_{2\,max}$=3.17 (%LBM)−217.88
	DE	$VO_{2\,max}$=2.04 (%LBM)−123.95
	RDE	$VO_{2\,max}$=1.85 (%LBM)−109.18

BH: Body height, BW: Body weight, BMI: Body mass index, BSA: Body surface area, BD: Body density, TBF: Total body fat, % BF: % body fat, LBM: Lean body mass, % LBM: % lean body mass, CG: Control group, FDE: Food delivery executives, DE: Delivery executives, RDE: Rapid delivery executives

Table 6: Multiple regression norms for $VO_{2\,max}$ prediction from body composition parameters.

Outcome variable	Groups	Regression equation	R	R^2
$VO_{2\,max}$ (L/min)	CG	$VO_{2\,max}$=0.03 (BH)−1.66	0.53	0.26
	RDE	$VO_{2\,max}$=−0.61 (BH)−1.02 (BW)+83.64 (BSA)+20.11	0.77	0.54
$VO_{2\,max}$ (mL/kg/min)	FDE	$VO_{2\,max}$=1.37 (BH)−87.63 (BSA)−31.04	0.80	0.63
	RDE	$VO_{2\,max}$=813.97 (BD)−818.66	0.58	0.31

BH: Body height, BD: Body density, BSA: Body surface area, BD: Body density, BW: Body weight, CG: Control group, FDE: Food delivery executives, DE: Goods delivery executives, RDE: Rapid delivery executives

elevated muscle tissue formation in the body, at the same time minimising the %fat.[22]

Corresponding to VO_{2max} of the studied groups, significantly higher values were observed in the experimental groups than CG. Intra-group variation was also evident in terms of absolute VO_{2max} between FDE and DE, which is analogous to previous literature inferring that manual handling protocols involve intermittent repetition of movements, which is strongly correlated to HR and aerobic capacity (VO_{2max}). For procuring an account of exertions entailed, VO_{2max} in combination with HR can cater as efficacious indicators.[23] Individuals infused in manual activities usually tend to possess higher VO_{2max} on account of the physically demanding activities, which lead to increased utilisation of oxygen in the course of undergoing strenuous exertions.[24]

Correlation analysis between body composition variables and VO_{2max} revealed that significant relationships exist in the studied groups between both absolute and relative VO_{2max} and various body composition parameters. Age displayed a significant negative correlation to relative VO_{2max} in FDE, which can be attributed to reduced mitochondrial functioning, cardiac output, declination in muscle mass and changes in various lung capacities.[25] Body height displayed significant relationships with both relative VO_{2max} (in FDE) and absolute VO_{2max} (in CG, FDE and RDE). Taller individuals tend to have lower relative VO_{2max} when considered in terms of their body weight.[26] With the increase in height, the absolute VO_{2max} tends to increase, as evidenced by previous researches. However, the relationship might not always be straightforward since greater muscle mass and larger delivery capacity of oxygen are infused with greater body height, which is likely to manifest in higher VO_{2max}.[27] Body weight displayed significant relationships with both relative VO_{2max} (in FDE) and absolute VO_{2max} (in CG and RDE), which pertains to a previous evidence inferring that relative VO_{2max} decreases with an increase in body weight because higher body fat percentage reduces the maximal oxygen consumption by muscles.[28] Greater muscle mass through exercise might manifest to gain in weight slightly which in turn can contribute to increasing absolute VO_{2max}.[29] BMI exhibited significant relationships with relative VO_{2max} in CG, FDE and RDE. Evidences from previous researches also state that higher BMI is associated with lower relative VO_{2max} on account of higher body fat percentage.[30-32] BSA displayed significant relationships with relative VO_{2max} (in FDE) and absolute VO_{2max} (in CG and RDE). The sum of skinfolds displayed significant correlations both with absolute VO_{2max} (in DE) and relative VO_{2max} (in RDE). With the increase in sum of skinfolds, both relative and absolute VO_{2max} decrease essentially because higher body fat is linked to lower maximal oxygen consumption.[33] BD exhibited significant relationships with relative VO_{2max} in FDE, DE and RDE and absolute VO_{2max} in DE. TBF exhibited significant relationships with relative VO_{2max} in FDE, DE and RDE and absolute VO_{2max} in CG. %Body Fat displayed significant relationships with relative VO_{2max} in FDE, DE and RDE and absolute VO_{2max} in DE which validates prior justifications stating that fat tissue is less active metabolically in comparison to muscle tissue; therefore, a higher %Body Fat indicates lesser oxygen consumption in course of exercises, leading to lower relative VO_{2max} levels.[29] LBM displayed significant correlations with relative VO_{2max} in FDE and absolute VO_{2max} in CG, DE and RDE. A greater LBM possesses a negative correlation with relative VO_{2max} because higher LBM can contribute to higher body weight thereby leading to lowered relative VO_{2max}. However, when the value of absolute VO_{2max} is taken into consideration, then a directly proportional relationship is observed because, in the case of absolute VO_{2max}, the body weight of subjects is not considered.[33,34] %LBM exhibited significant correlations with relative VO_{2max} in FDE, DE and RDE and absolute VO_{2max} in DE, respectively. A positive correlation of relative and absolute VO_{2max} with %LBM indicates a higher potential for utilisation of oxygen in the course of manual work.[34]

Multiple linear regression analysis revealed that body height served as an independent predictor of VO_{2max} (L/min) in CG while body height along with body weight and BSA served as independent predictors of the same in RDE whereas body height along with BSA predicted VO_{2max} (mL/kg/min) in FDE and BD predicted the same in RDE.

CONCLUSION

The present study inferred that in terms of the body composition parameters and VO_{2max}, significant differences were evident between the online DEs and their sedentary counterparts, which can be attributed to differences in their manual work intensities compelled by their job designs. Intra-group variations in terms of DBP, absolute VO_{2max} and sum of skinfolds are consequences of minor differences in the workloads of online DEs, which often include differences in lifting frequencies of consignments, mode of transportation, time constraints for delivery, etc. Significant correlations between VO_{2max} and body composition parameters such as age, body height, BMI, BSA, sum of skinfolds, BD, TBF, %BF, LBM and %LBM with relative and absolute VO_{2max} in various groups indicate that VO_{2max} of the subjects is significantly influenced by these variables. Furthermore, body height, body weight, BSA and BD were independent predictors of relative and absolute VO_{2max} in different groups as indicated by multiple linear regression analysis. Proper exercise and training regimen for ameliorating body composition and cardiorespiratory fitness can significantly aid in promoting the health status of online DEs as well as improve their work efficacy and comfort. Training will significantly equip them with skills that are much required for coping with daily delivery challenges, customer services and navigation, while exercise can induce significant edifications in their body balance and endurance.

Data availability

Data used to support the findings of the study are available from the corresponding author upon reasonable request.

Reporting guidelines

The STROBE guidelines were considered for designing, reporting the data and findings of the study.

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Author contributions: DM: Data collection and first draft; DM, AB: Analysis; TD: Checking the analysis. The manuscript was corrected, modified and approved by all other authors and all have adequately contributed to this research.

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