SUPPLEMENTARY DATA

DISCUSSION

To the best of the author’s knowledge, only six studies, largely detailed in the Supplementary Data Tables 1 and 2, have examined the effects of RF on adults’ respiratory mechanics (Abdel-aziz & Ibraheem, 2008; Duncan et al., 1990; Moosavi et al., 2007; Siddiqui et al., 2005; Singha Roy & Bandyopadhyay, 2016; Subhan et al., 2006).
| Reference                  | Duncan et al. (1990) | Siddiqui et al. (2005) | Subhan et al. (2006) | Moosavi et al. (2007) | Abdel-aziz & Ibraheem (2008) | Singha Roy & Bandyopadhyay (2016) |
|---------------------------|----------------------|------------------------|----------------------|------------------------|-------------------------------|----------------------------------|
| **Town (country)**        | .Kuala Lumpur (Malaysia) | .Karachi (Pakistan) | .Karachi (Pakistan) | .Tehran (Iran) | .Assiut (Egypt) | .Kolkata (India) |
| **Ramadan year**          | .NR | .2001 | .2001 | .2000 | .2006 | .2014 |
| **Study timing**          | .1400 to 1600 | .1400 to1600 | .After 1100 | .Between 1400 and 16h00 | .1200 to1600 | .1400 to 1700 | .2-4 hours before breakfast | .1200 to 1400 |
| **Average ambient temperature** | .23°c | .NR | .20-23°c | .NR | .32-36°c | .NR |
| **Average ambient pressure** | .758 mmHg | .NR | .NR | .NR | .NR | .NR |
| **Evaluation sessions’ number** | .MR2-3 | .One month AR | .10 days BR | .10 days BR | .10 days BR | .15 days BR | .10 days AR | .10 days BR | .15 days AR | .10 days BR | .10 days BR |
| **Elapsed fasting time**  | .NR | .NR | .NR | .NR | .10-12 h | .NR |

**STUDY CHARACTERISTICS**

| Ethnic                  | Malay | Pakistani | Pakistani | Iranian | Arab | Indian |
|-------------------------|-------|-----------|-----------|---------|------|--------|
| Sample size (Male/Female) | .13/0 | .46/0 | .46/0 | .77/40 | .32/0 | .50/0 |
| Sample size calculation | .NR | .NR | .NR | .Unknown equation | .NR | .Method of Das & Das (1998) |
| Randomization           | .NR | .NR | .NR | .Simple method | .NR | .NR |
| Recruitment method      | .NR | .Convenience sample: personal request from staff and students local university | .Convenience sample: personal request from staff and students local university | .Convenience sample: students, professors, employees of local University | .Convenience sample: student | .Sample random sampling. | .Different part of Kolkata |
| Inclusion criteria | Duncan et al. (1990) | Siddiqui et al. (2005) | Subhan et al. (2006) | Moosavi et al. (2007) | Abdel-aziz & Ibraheem (2008) | Singha Roy & Bandyopadhyay (2016) |
|--------------------|----------------------|------------------------|----------------------|----------------------|-------------------------------|----------------------------------|
| Young healthy      | Healthy              | Healthy                | Healthy              | Healthy              | Healthy                       | Healthy                          |
| Male               | Male                 | Male                   | Male                 | Male                 | Non-smoking                   | Sedentary                        |
| Adults             |                      |                        |                      |                      |                               | Non-smoker                       |
| Sedentary habits   |                      |                        |                      |                      |                               |                                  |
|                     |                      |                        |                      | Healthy              |                                |                                  |
| Non-inclusion and  |                      |                        |                      |                      | Non-smoking                   |                                |
| exclusion criteria |                      |                        |                      |                      |                               | Sedentary                        |
| Heavy smoker       |                      | Non smoking            |                      | Lack of cooperation   | Diabetes mellitus             | Pulmonary disease                |
| Female             |                      | .Non smoking           |                      | .Smoker              | .Renal disease                | .Major disease                   |
| Vertebra column or |                      | .Vertebrea column or   |                      | .Asthma              | .Respiratory and cardiovascular| .Non-Muslim                      |
| thoracic cage      |                      | thoracic cage          |                      | .Chronic bronchitis    | diseases                      | .Regular exercise                |
| abnormalities’     |                      | abnormalities’         |                      | .Pneumonia            | .Major abdominal or thoracic   | .Medication-use                  |
| Histories of       |                      | .Histories of          |                      | .Fasting for at least 3| .Respiratory and cardiovascular| .History of health complication  |
| malignancy         |                      | malignancy             |                      | days in 1st visit      | diseases                      |                                  |
| Diabetes mellitus  |                      | .Diabetes mellitus     |                      | .Fasting for at least 3| .Major abdominal or thoracic   |                                  |
| Respiratory or     |                      | .Respiratory or        |                      | days in last visit     | surgeries                      |                                  |
| neuromuscular or   |                      | neuromuscular or       |                      | .Gross abnormalities   | .Gross abnormalities           |                                  |
| cardiovascular      |                      | cardiovascular or      |                      | of the vertebra column| .FEV 1/FVC < 0.70              |                                  |
| diseases            |                      | cardiovascular diseases|                      | or thoracic cage       |                               |                                  |
| Major abdominal or |                      | .Major abdominal or    |                      | .FEV 1/FVC < 0.70      |                               |                                  |
| thoracic surgery   |                      | thoracic surgery       |                      | .Abnormal BMI         |                               |                                  |
| FEV 1/FVC < 0.70   |                      | .FEV 1/FVC < 0.70      |                      | .Previous drug or      |                               |                                  |
| Abnormal BMI       |                      | .Abnormal BMI          |                      | tobacco               |                               |                                  |
| Previous drug or   |                      |                        |                      |                      |                               |                                  |
| tobacco            |                      |                        |                      |                      |                               |                                  |
| Ramadan experience | Fast Ramadan         | NR                     | NR                   | NR                   | NR                            | NR                               |
| annually           |                      |                        |                      |                      |                               |                                  |
| NR                 |                      |                        |                      |                      |                               |                                  |
| Table 1 continued | Duncan et al. (1990) | Siddiqui et al. (2005) | Subhan et al. (2006) | Moosavi et al. (2007) | Abdel-aziz & Ibraheem (2008) | Singha Roy & Bandyopadhyay (2016) |
|-------------------|---------------------|-----------------------|---------------------|-----------------------|-----------------------------|---------------------------------|
| Fasting days      | .NR                 | .NR                   | .NR                 | 26.2 (25.1-27.3)$^f$  | .NR                         | .NR                             |
| Applied questionnaire | .NR                     | .Not-specified        | .Not-specified      | .Not-specified         | Not-specified               | .ATS (Ferris, 1978)             |
| ANTHROPOMETRIC DATA |                     |                       |                     |                       |                             |                                 |
| Age (years)       | .24.3±1.6$^a$       | .16-41$^d$           | .16-41$^d$         | .27.9 (26.2-29.6)$^f$ | .18-19$^d$                  | .20-24$^d$                     |
| Height (cm)       | .170±2.0$^a$        | .172.5±1.1$^e$       | .172.5±1.1$^e$     | .167.1 (164.9-169.2)$^f$ | .170.7±3.1$^e$             | .159.2-172.2$^e$               |
| Weight (kg)       | .57±2$^a$           | .70.48±2.20$^e$      | .70.48±2.20$^e$    | .67.6 (65.7-69.5)$^f$ | .70.58±2$^e$               | .62.1±11.25$^e$                |
| BMI (kg/m$^2$)    | .23.5±0.57$^f$      | .23.5±0.57$^e$       | .NR                | .NR                   | .NR                         | .NR                            |
| BSA (m$^2$)       | .1.62±0.03$^a$      | .NR                  | .NR                | .NR                   | .NR                         | .NR                            |
| LUNG FUNCTION DATA |                     |                       |                     |                       |                             |                                 |
| Collected data    | FVC, FEV$_1$, PEF, ERV, FRC, TLC, RV, anatomic VD | FVC, FEV$_1$, PEF, MMEF, FEF, FEV$_1$/FVC, MVV | FVC, FEV$_1$, PEF, MMEF, FEF, FEV$_1$/FVC, FEV$_1$ | FVC, FEV$_1$, PEF, MMEF, FEF, FEV$_1$/FVC, arterial blood gases | FVC, FEV$_1$, PEF, MMEF, FEF, FEV$_1$/FVC, forced expiratory time |
| Calibration       | .NR                 | .Daily (1-L syringe)  | .Daily (1-L syringe) | .Daily (1-L syringe) | .Daily (1-L syringe) | .Daily (Respiratory hand pump) |
| Applied norms     | .Local              | .NR                  | .NR                | .NR                   | .NR                         | .NR                            |
| Subject position  | .Standing           | .Sitting             | .Sitting           | .NR                   | .Sitting                    | .NR                            |
| Control-group     | .No                 | .No                  | .No                | .No                   | .No                         | .n=50 untrained Muslim males   |
| Table 1 continued. | Duncan et al. (1990) | Siddiqui et al. (2005) | Subhan et al. (2006) | Moosavi et al. (2007) | Abdel-aziz & Ibraheem (2008) | Singha Roy & Bandyopadhyay (2016) |
|---------------------|----------------------|-----------------------|----------------------|-----------------------|-----------------------------|-------------------------------|
| **Applied guidelines** | .Highest value of 3 flows efforts. .Average volumes value retained. .**Anatomic VD:** Bohr’s equation *(Comroe, 1962)* .Maximum value of 4 PEF efforts. .Volumes and anatomic VD corrected to BTPS .PEF in ATPS | .ATS (1987) .Volumes corrected to BTPS | .ATS (1987) | .NR | .ATS (1987) .Volumes corrected to BTPS | .Procedure of Bandyopadhyay et al. (2013) |
| **Statistical Analyses** | .T-test .Bonferroni’s correction | .ANOVA .Bonferroni’s correction .Linear regression between weight and spirometric data .Outliers (> 3 SD from the mean) excluded | .ANOVA .Bonferroni’s correction .Linear regression between weight or fasting days and spirometric data | .T-test .Chi-2 test .Pearson correlation | .ANOVA .Linear regression between weight or fasting days and spirometric data | .Paired student t test .One-way repeated measure analysis of variance. .Unpaired student’s t test: significance of differences between mean values of Control and experimental groups. |

ANOVA: analysis of variance. AR: after-Ramadan. ATPS: ambient, temperature, pressure, saturation. ATS: American thoracic society. BMI: body mass index. BR: before-Ramadan. BSA: body surface area. BTPS: body, temperature, pressure, saturation. ERV: expiratory reserve volume. FEx%; forced expiratory flow when X% of FVC has been exhaled. FEV1: 1st second forced expiratory volume. FRC: functional residual capacity. FVC: forced vital capacity. NR: not-reported. MMEF: maximal mid expiratory flow. MR: mid-Ramadan. MR1: 1st week of Ramadan. MR2: 2nd week of Ramadan. MR3: 10 last days of Ramadan. MR2-3: between the MR2 and the 3rd week of Ramadan. MVV: maximal voluntary ventilation. PEF: peak expiratory flow. R: Ramadan. RV: residual volume. TLC: total lung capacity. SVC: slow vital capacity. VT: tidal-volume. VD: dead volume. Data are: *Mean±Standard error. *Mean (95% confidence interval). *Mean±Standard deviation (SD). *Minimum-maximum. *Mean±Standar error of mean. *Mean (minimum-maximum).
### Table 2. Main results of the published studies aiming to evaluate the effects of Ramadan-fasting (RF) on The spirometric data of healthy adults.

| Study                          | BR          | MR1             | MR             | MR2             | AR          |
|-------------------------------|-------------|-----------------|----------------|-----------------|-------------|
| **Duncan et al. (1990)**      |             |                 |                |                 |             |
| Weight (kg)                   | 55.6±1.9    | 57.0±2.0        |                |                 |             |
| FVC (L)                       | 3.82±0.11a  | 3.90±0.12       |                |                 |             |
| FEV₁ (L)                      | 3.37±0.11a  | 3.37±0.11       |                |                 |             |
| FEV₁/FVC (absolute value)     | 0.86±0.01a  | 0.86±0.01       |                |                 |             |
| FRC (L)                       | 3.31±0.16a  | 3.08±0.18       |                |                 |             |
| RV (L)                        | 1.80±0.12a  | 1.70±0.16a      |                |                 |             |
| TLC (L)                       | 5.62±0.19a  | 5.60±0.24       |                |                 |             |
| RV/TLC (absolute value)       | 0.32±0.1a   | 0.30±0.02       |                |                 |             |
| PEF (L/min)                   | 520±14a     | 571±14a         |                |                 |             |
| VD (mL)                       | 172±5.0     | 184±5.6         |                |                 |             |
| VT (mL)                       | 536±23a     | 487±22a         |                |                 |             |
| VD/VT (absolute value)        | 0.33±0.02   | 0.38±0.02       |                |                 |             |
| **Conclusion**                | RF does not exert a significant effect on pulmonary volume functions, but a reduction in the VD/VT ratio and PEF. |             |                |                 |             |
| **Siddiqui et al. (2005)**    |             |                 |                |                 |             |
| Weight (kg)                   | 7.048±2.20b  | 69.96±2.22b     | 70.87±2.14b     |                 |             |
| FVC (L)                       | 4.61±0.12b  | 4.70±0.13b      | 4.54±0.13b      |                 |             |
| FEV₁ (L)                      | 3.76±0.11b  | 3.77±0.10b      | 3.72±0.11b      |                 |             |
| FEV₁/FVC (absolute value)     | 0.80±0.01   | 0.80±0.09       | 0.81±0.01       |                 |             |
| PEF (L/min)                   | 608±16b     | 613±15b         | 607±15b         |                 |             |
| VD/EF (L/s)                   | 3.80±0.19b  | 3.80±0.17b      | 3.97±0.18b      |                 |             |
| MVV (L/min)                   | 142±4b      | 141±4b          | 140±4b          |                 |             |
| **Conclusions**               | AR weight was significantly higher relative to that MR. AR FVC shows a significant decrease compared to the MR values. No change in MR lung function variables. |             |                |                 |             |
| **Subhan et al. (2006)**      |             |                 |                |                 |             |
| Weight (kg)                   | 70.48±2.20b | 69.96±2.22b     | 70.87±2.14b     |                 |             |
| FEF75% (L/s)                  | 7.78±0.26b  | 7.59±0.25b      | 7.68±0.27b      |                 |             |
| FEF50% (L/s)                  | 4.50±0.18b  | 4.50±0.19b      | 4.59±0.19b      |                 |             |
| FEF75% (L/s)                  | 1.70±0.12b  | 1.60±0.09b      | 1.85±0.11b      |                 |             |
| FEF75.85% (L/s)               | 1.13±0.11b  | 1.08±0.08b      | 1.26±0.10b      |                 |             |
| **Conclusions**               | RF does not affect expiratory flow rates. AR values showed an increase in FEF75% and FEF75.85%. |             |                |                 |             |
Table 2 continued.

| Measurement | BR | MR1 | MR | MR2 | AR |
|-------------|----|-----|----|-----|----|
| Weight (kg) | 68.6 (65.7-69.5)c | 91.4 (88.9-94.2)c | NR | 92 (88.9-95.1)c | 61.7 (65.2-69.0)c |
| FEV<sub>1</sub> (%) | 87.5 (84.4-90.6)c | 91.4 (88.9-94.2)c | NR | 92 (88.9-95.1)c | 61.7 (65.2-69.0)c |
| FVC (%) | 85.4 (82.2-88.6)c | 88.3 (85.2-91.3)c | NR | 88.6 (85.4-91.8)c | 61.7 (65.2-69.0)c |
| SVC (%) | 85.8 (82.8-88.9)c | 88.7 (85.7-91.7)c | NR | 88.7 (85.8-91.7)c | 61.7 (65.2-69.0)c |
| FEV<sub>1</sub>/FVC (%) | 81.4 (78.6-84.2)c | 84.4 (82.3-86.5)c | NR | 83.8 (81.8-85.7)c | 61.7 (65.2-69.0)c |
| PEF (%) | 71.1 (66.5-75.8)c | 84.8 (84.9-92.8)c | NR | 89.4 (85.8-93.1)c | 61.7 (65.2-69.0)c |
| FEV<sub>50</sub> (%) | 93.1 (86.9-99.2)c | 98.3 (92.2-104.4)c | NR | 95.2 (90-100.4)c | 61.7 (65.2-69.0)c |
| SVC (%) | 85.8 (82.8-88.9)c | 84.5 (80.5-88.6)c | NR | 88.7 (85.7-91.7)c | 61.7 (65.2-69.0)c |
| FEV<sub>50</sub> (%) | 94.5 (91.5-101.2)c | 88.7 (85.4-91.8)c | NR | 94.7 (89.5-99.9)c | 61.7 (65.2-69.0)c |
| FEV<sub>25</sub> (%) | 88.8 (83.2-94.4)c | 94.6 (89.1-100.2)c | NR | 94.7 (89.5-99.9)c | 61.7 (65.2-69.0)c |
| MMEF (%) | 88.3 (83-93.7)c | 102.1 (94.8-109.4)c | NR | 94.7 (89.5-99.9)c | 61.7 (65.2-69.0)c |

**Other results**

Significant correlation between fasting days and weight measured at the 4 visits, and height and FEF<sub>50</sub> and MMEF of MR2 and SVC (MR1) and FEV<sub>1</sub>/FVC (MR1 and MR2).

**Conclusion**

RF increases lung volumes.

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**Abdel-aziz & Ibraheem (2008)**

| Measurement | BR | 1<sup>st</sup> day | 8<sup>th</sup> day | 16<sup>th</sup> day | 22<sup>nd</sup> day | 30<sup>th</sup> day | AR |
|-------------|----|------------------|-----------------|-----------------|-----------------|-----------------|----|
| Weight (kg) | 70.58±2.0d | 69.3±3.5d | 62.78±10.19d | 61.45±10.03d | 61.73±10.82d | 60.24±9.89d | 60.12±9.12d |
| FVC (L) | 3.47±0.3d | 3.56±0.2d | 3.56±0.2d | 3.56±0.2d | 3.56±0.2d | 3.56±0.2d | 3.56±0.2d |
| FEV<sub>1</sub> (L) | 3.08±0.4d | 3.12±0.2d | 3.12±0.2d | 3.12±0.2d | 3.12±0.2d | 3.12±0.2d | 3.12±0.2d |
| FEV<sub>1</sub>/FVC (absolute value) | 0.88±0.092d | 0.87±0.069d | 0.87±0.069d | 0.87±0.069d | 0.87±0.069d | 0.87±0.069d | 0.87±0.069d |
| PEF (L/S) | 7.77±0.4d | 7.81±0.5d | 7.81±0.5d | 7.81±0.5d | 7.81±0.5d | 7.81±0.5d | 7.81±0.5d |

**Conclusion**

Healthy males could tolerate fasting the month of Ramadan without significant alteration of their respiratory system functions.

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**Singha Roy & Bandyopadhyay (2016)**

| Measurement | BR | 1<sup>st</sup> day | 8<sup>th</sup> day | 16<sup>th</sup> day | 22<sup>nd</sup> day | 30<sup>th</sup> day | AR |
|-------------|----|------------------|-----------------|-----------------|-----------------|-----------------|----|
| Weight (kg) | 62.10±11.25d | 62.78±10.19d | 61.98±10.65d | 61.45±10.03d | 61.73±10.82d | 60.24±9.89d | 60.12±9.12d |
| VT (L) | 5.83±0.59d | 5.69±0.41d | 5.52±0.42d | 5.66±0.40d | 5.58±0.37d | 5.72±0.39d | 5.58±0.42d |
| SVC (L) | 4.10±0.53d | 4.16±0.62d | 4.00±0.56d | 4.14±0.71d | 4.20±0.57d | 4.08±0.63d | 4.09±0.52d |
| FVC (L) | 3.83±0.52d | 3.86±0.71d | 3.88±0.71d | 4.06±0.51d | 3.90±0.53d | 3.90±0.53d | 3.90±0.53d |
| FEV<sub>1</sub> (L) | 3.52±0.62d | 3.76±0.55d | 3.60±0.71d | 3.84±0.67d | 3.66±0.63d | 3.70±0.70d | 3.76±0.56d |
| FEV<sub>1</sub>/FVC (absolute value) | 0.91±0.07d | 0.94±0.06d | 0.90±0.06d | 0.91±0.06d | 0.92±0.06d | 0.93±0.06d | 0.93±0.06d |
| MMEF (L/min) | 278.46±81.23d | 270.45±60.86d | 283.81±61.27d | 269.00±58.39d | 280.71±63.35d | 280.04±57.57d | 280.57±69.07d |
| FEV<sub>50,85</sub> (L/min) | 75.86±17.52d | 76.96±16.07d | 72.46±15.28d | 72.71±19.04d | 70.29±20.18d | 73.77±18.56d | 75.00±17.77d |
| PEF (L/min) | 677.8±72.94d | 674.2±72.23d | 682.5±74.65d | 688.9±73.78d | 668.2±72.33d | 676.4±71.46d | 674.9±71.98d |

**Conclusion**

RF did not affect pulmonary function measurements.

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For abbreviations, see table 1. For Duncan et al. MR2 corresponds to MR2-3. Data are: *Mean±SE. †Mean±SEM. Mean (minimum-maximum). ‡Mean±SD. *p<0.05 (T-test): MR2 vs. AR in Duncan et al. study and AR vs. BR for weight of Moosavi et al. study. †Significant difference (ANOVA with Bonferroni’s correction): AR or BR vs. MR. ‡Significant difference (ANOVA without Bonferroni’s correction): four periods.
Effect of RF on Weight

The present study showed that relative to before-R baseline and after-R data, there was no significant effect of RF on weight in this group of healthy young adults. Therefore, it seems unlikely that the present study subjects were dehydrated.

In the studies evaluating the effects of RF on lung function data, confusing results were noted for weight: non-significant change (Duncan et al., 1990; Singha Roy & Bandyopadhyay, 2016), higher after-R weight compared to the weight obtained at mid-R (Siddiqui et al., 2005), higher after-R and before-R weights relative to mid-R (Subhan et al., 2006), higher before-R weight relative to after-R (Moosavi et al., 2007). Other studies, with different aims as the present one, reported also conflicting results: non-significant change (Sweileh, Schnitzler, Hunter, & Davis, 1992), significant decrease (Bigard, Boussif, Chalabi, & Guezennece, 1998) or increase (Frost & Pirani, 1987) in weight during Ramadan. There are many complications with comparisons of weight changes, which can lead to variations in weight loss or gain during RF (Moosavi et al., 2007; Siddiqui et al., 2005).

Some authors (Siddiqui et al., 2005; Subhan et al., 2006) have advanced many factors that can lead to weight-loss during RF: subject’s diet (lack of food and/or liquid ingested) and/or level of physical activity, season during Ramadan (winter/summer), fasting duration, whether baseline measurements are taken before-R or after-R and timing of weight measurements during the day and within the month of Ramadan. In their studies (Siddiqui et al., 2005; Subhan et al., 2006), dehydration hypothesis was excluded, since the fasts were performed in winter. However, the hydratation changes possibility is controversial: while some authors (Husain, Duncan, Cheah, & Ch'ng, 1987) have ruled out the risk of dehydration by measuring the fluid intake and 24 h urinary output during Ramadan, others (Sweileh et al., 1992) showed that subjects were dehydrated only during the first week of
Ramadan (as shown by increases in serum electrolytes and protein) and these differences were normalized in Ramadan’s last week. In another study (Ramadan, Telahoun, Al-Zaid, & Barac-Nieto, 1999), fluid balance was better maintained in active subjects compared to non-active ones, as the latter had significant increases in their blood osmolarity at the end of RF. Moosavi et al. (2007) have advanced two explanations for the weight gain observed during RF. The first one was the change in nutritional intake and frequency of meals. Although total food consumption is limited during Ramadan, more main dishes are prepared at home and more desserts are usually consumed. The second explanation was about physical activity during Ramadan known to be reduced. As a result, the total body metabolism is affected and lipid metabolism and blood lipid levels change during this month (Duncan et al., 1990).

In a recent systematic review including 35 English-language studies, it was concluded that RF could result in relatively small but significant weight loss (-1.24 kg; 95% confidence interval: -1.60, -0.88 kg) in both sexes and most of the weight loss was regained within a few weeks after-R (Sadeghirad, Motaghipisheh, Kolahdooz, Zahedi, & Haghdoot, 2014).

**How can changes in lung function data during RF be explained?**

In the present study, it may be hypothesized that, the hydration status of the Tunisian adults was not disturbed and insignificant changes in the weight may have had some physiological impact to preserve the spirometric data during the RF. It also seems that muscle contractile force and strength, and then expiratory efforts, were not changed in a fasting state if subjects maintained their hydration, motivation and training status (Shephard, 2015; Soori et al., 2016). Duncan et al. (1990) have made other hypothesis such as the absence of changes in alveoli elasticity which may result from the fasting diet.
Several hypotheses were made to explain the decrease or the increase of some lung function data during RF. The PEF, the FEF$_{75\%}$, and FEF$_{75-85\%}$ and the FVC decreases were explained by reductions in the expiratory muscle effort and anatomic dead-space-volume (Duncan et al., 1990) or by modifications in both body-water and fat content (Subhan et al., 2006) or by weight loss (Siddiqui et al., 2005). To explain the mechanisms resulting in pulmonary volumes increases, Moosavi et al. (2007) gave numerous explanations such as weight changes, decrease in contact with food allergens; flattening of the diaphragm due to stomach emptiness; decrease in smoking and/or gastroesophageal reflux; increase in catecholamine; a bronchodilator agent, due to starvation stress.

**Study Limitations**

The convenience sampling is a major confounding factor (Abdel-aziz & Ibraheem, 2008; Duncan et al., 1990; Moosavi et al., 2007; Siddiqui et al., 2005; Singha Roy & Bandyopadhyay, 2016; Subhan et al., 2006). Convenience sampling is a type of non-probability sampling technique based on the judgment of the researcher (Sousa, Zauszniewski, & Musil, 2004). Convenience sampling suffers from a number of biases. It can lead to the under/over representation of particular groups within the sample and undermines ability to make generalizations from the present sample to the population being studied. Whilst convenience sampling should be treated with caution, its low cost and ease of use makes it the preferred choice for a significant proportion of researchers (Abdel-aziz & Ibraheem, 2008; Duncan et al., 1990; Moosavi et al., 2007; Siddiqui et al., 2005; Singha Roy & Bandyopadhyay, 2016; Subhan et al., 2006).

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