



Capsulation of the global fitness status and body composition of the young Toto women: The smallest tribal community of India



Pallav Sengupta

Department of Physiology, Vidyasagar College for Women, University of Calcutta, 39, Sankar Ghosh Lane, Kolkata 700 006, West Bengal, India

ARTICLE INFO

Article history:

Received 7 October 2015

Received in revised form 8 November 2015

Accepted 13 December 2015

Available online 31 December 2015

Keywords:

Physical fitness
Harvard step test
Anaerobic power
Body fat
Toto

ABSTRACT

Background: Toto is the smallest tribal population of India and the number of women, who shoulder the responsibility for expansion of the community and contribute equally to the economy by doing energy-demanding jobs, is gradually declining with respect to the number of males. But, the data regarding their physiological and fitness status is scant.

Aim: The present cross-sectional study is the first attempt to investigate the fitness and malnutrition by morphometrics among Toto women influenced by their occupational workload and improper nutrition.

Methods: The study drew on young Toto women, randomly selected from Totopara, Jalpaiguri, West Bengal (mean age 23.4 years). Measurements of body composition included several anthropometric variables; while physical efficiency parameters were physical fitness index (PFI), VO_{2max} , energy expenditure and anaerobic power.

Results: Analysis showed the majority of Toto women were mildly underweight (48%). They also showed lower fat mass and waist-to-hip ratio (WHR) and conicity index. They were found to have excellent physical fitness [82.2(±4.62)%], which positively correlated with family income ($R^2 = 0.550$) and level of education ($R^2 = 0.508$).

Conclusion: The findings of the study reports almost three quarters of Toto women are underweight. This study also shows the physical fitness status of young Toto women, which influences their economy, occupational workload, and poor nutritional status.

© 2015 Elsevier Ltd. All rights reserved.

1. Background

Toto, a tribal population of West Bengal, is the smallest tribe of India with their unique heritage, culture and language. They live in a small enclave called Totopara in the Jalpaiguri district of West Bengal, India which is located at the foot of the Himalayas, on the western bank of Torsa River, just to the south of the borderline between Bhutan and West Bengal (Biswas, 2013). Totos were nearly extinct in 1951 when their population was only 321 individuals (first census after independence and partition of India), but now the population has increased to about 1387 (Census 2011; Table 1) (Das,

2011). Although the Government is undertaking several policies to save the Totos (Majumder, 1998), much more detailed studies are required to find out their social, psychological and health problems. Research shows that the Toto have a high carrier rate of Thalassemia (45%), attributed to their custom of marrying within the community (Dash Sharma, 2004; Ghosh, Banerjee, & Biswas, 2004). Toto females are also reported to suffer from depression and psychological disorders (Ghosh et al., 2004). Toto people are also reported to suffer from water borne diseases due to lack of sanitation and hygiene (Dash Sharma, 2004). The poor health conditions and continuous decline of the Toto lifestyle needs immediate action, including research to analyse the health conditions of the tribe to inform Government and community action with the Toto people.

Along with their poor socio-economic and health status, census data over the last few decades has shown a gradual decrease in the number of females relative to males (Table 2) (Dawn, 2014; Das, 2011). As population growth largely depends on women, special care is needed to improve their health. Equally, economic growth among the Toto draws on women engaging in physical energy

Abbreviations: BC, buttock circumference; BMI, body mass index; BSA, body surface area; CC, calf circumference; CED, chronic energy deficiency; FPA, female physical attractiveness; HST, Harvard step test; MUAC, mid upper arm circumference; PBF, percentage of body fat; PFI, physical fitness index; SDA, specific dynamic action; TC, thigh circumference; TEE, total energy expenditure; VO_{2max} , maximal aerobic capacity; WC, waist circumference; WHR, waist-to-hip ratio.

E-mail address: sunny-pallav.1984@yahoo.co.in

Table 1
Socio-demographic data of Totopara, Jalpaiguri district.

Area	8.08 km ²
Location	89°20' E and 26°50' N
Total population (as per 2011 census)	1387
Total males	737
Total females	650
Growth (2001–2011)	19.88%
Per capita income (rupees per month)	1966.66
Average family size	5.16
Literacy rate	Male: 36.36%; female: 23.53%; total: 30.35%

intensive labour, including cultivation (Dawn, 2014; Dhargupta, Goswami, Sen, & Majumder, 2009). In 1993, a study reported the overall health status of tribal women of India (Basu, 1993), without reporting the health of Toto women in detail; it is therefore relevant to carry out an investigation regarding their fitness, as their economic status may fail to support the nutritional demands of their labour. To date, there is no detailed report regarding the overall physiological and health status of Toto people, specifically on their physical fitness status. The present study reports an assessment of the fitness and nutritional status of young Toto women based on estimates drawn from morphometric indices.

2. Participants and Methods

Respondents of this small-scale study included 50 young Toto women (age of 23.4 ± 2.91 years) of Totopara, Jalpaiguri, West Bengal. The entire experimental protocol was explained to them to allay apprehensions. Consent from each participant was taken for conducting the study and the experiments were carried out following Institutional ethical permission. Participants were instructed to take their last meal at least 2 h before conducting the test in order to avoid the specific dynamic action (SDA) of food. All the experiments were carried out, and measurements were taken in temperature of 20°–25 °C and relative humidity of about 45–50% in the winter season in India to avoid seasonal influence on fitness. To minimise experimenter bias, each measurement was taken three times, and the mean taken as the final result.

The body mass index (BMI) was measured by the following formula (Eknoyan, 2008; Keys, Fidanza, Karvonen, Kimura, & Taylor, 1972): $BMI = \text{mass (kg)} / (\text{height in m})^2$. Body fat percentage was estimated by a predictive formula using BMI, age, and gender (Deurenberg, Weststrate, & Seidell, 1991). Estimates from this formula vary approximately 5–10%. Banerjee and Sen's (1995) formula was used to estimate body surface area (BSA).

Resting heart rate was recorded after 5 min of rest at the carotid pulse. When two successive heart rate scores were equal then it was considered the resting heart rate (Sengupta & Krajewska-Kulak, 2013). Arterial blood pressure was measured by using a sphygmomanometer (Booth, 1977).

Physical fitness index (PFI) was calculated by measuring heart rate after performing Harvard step test (HST) developed by Brouha et al. (1943). It was first developed in the Harvard Fatigue Laboratories using the long form of the PFI equation. The HST was modified for Indian conditions using a stool 51 cm high, stepping up and down with a rate of 30 cycles per minute for 3 minutes or up to exhaustion. Exhaustion is defined as when the participant cannot maintain the stepping rate for 15 s. After completion of the test, peak heart rate was recorded, and the recovery pulse was counted at 1–1.5, 2–2.5 and 3–3.5 min of recovery. Then the duration of exercise (in seconds) was divided by the sum of recovery heart rates to get the PFI. This is generally expressed in percent values. It also provided a reference range that if the PFI value (%) was below 40 the fitness was deemed very poor, 41–50 poor, 51–60 average, 61–70 good, 71–80 very good, and above 80 excellent. The measurement variability for the HST is approximately 5–10% (Brouha et al., 1943).

To calculate anaerobic power, the Margaria Double Step test was carried out (Margaria, Aghemo, & Rovelli, 1966). It is a short-term anaerobic test or a power test in which the subject is climbing two steps at a time; the height of the stairs is measured by measuring tape. To calculate anaerobic power, the height of ascent, body weight and duration (seconds) were taken. The work done was calculated as: $\text{work done (kg m}^{-1}\text{)} = \text{body weight} \times \text{height of ascent} \times 0.002342$. Then the work done was divided by the duration of the work (in seconds) to get anaerobic power ($\text{kg m}^{-1} \text{s}^{-1}$). Margaria Double Step test for anaerobic power have the variability of 5–6% (Margaria et al., 1966).

$VO_{2\text{max}}$ was estimated by using peak and resting heart rates (Astrand, Rodahl, Dahl, & Stromme, 1960). Total energy expenditure (TEE) has also been determined by another predictive formula using peak heart rate scores recorded during HST (Datta & Ramanathan, 1969).

Circumference measures were taken around the midpoint of upper arm (MUAC), thigh (TC), calf muscle (CC), waist (WC) and buttock (BC) by anthropometric tape. WC and BC are used to predict the body fat content. Eleven derived variables: body surface area (BSA), body mass index (BMI), body adiposity index (BAI), fat mass (FM), fat mass index (FMI), fat free mass (FFM), fat free mass index (FFMI), waist-to-height ratio (WHTR), waist-to-hip ratio (WHR), MUAC-to-height ratio (MHR) and conicity index (CI) were included. All anthropometric measurements were made by

Table 2
Population distribution and sex ratio among Toto people of Totopara, Jalpaiguri District.

	Population		Total population	Sex ratio (female/1000 male)	Decadal growth rate
	Male	Female			
1901 (Census)	72	99	171	1375	–
1911 (Census)	125	110	255	880	49.12
1921 (Census)	140	131	271	936	6.27
1931 (Census)	130	204	334	1569	23.25
1941 (Census)	159	162	321	1019	–3.89
1951 (Census)	161	160	321	994	–2.18
1962 (ISI) ^a	206	189	616	917	96.18
1971 (Census)	275	269	675	978	9.58
1981 (Census)	362	350	762	967	12.74
1991 (Census)	470	457	922	972	21.16
2001 (Census)	620	575	1157	927	25.49
2011 (Census)	737	650	1387	882	19.88

^a ISI = Indian Statistical Institute.

Download English Version:

<https://daneshyari.com/en/article/889513>

Download Persian Version:

<https://daneshyari.com/article/889513>

[Daneshyari.com](https://daneshyari.com)