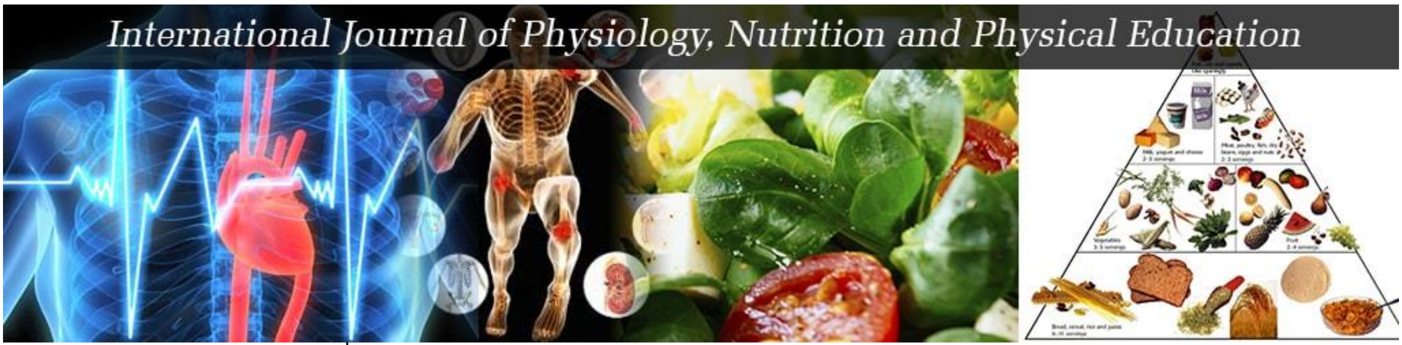

ISSN: 2456-0057
IJPNPE 2024; 9(2): 272-275
© 2024 IJPNPE
www.journalofsports.com
Received: 12-09-2024
Accepted: 16-10-2024

Sudip Naskar
Department of Physical Education, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Dr. BC Kapri
Department of Physical Education, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Corresponding Author:
Sudip Naskar
Department of Physical Education, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Nutritional status of marginalized children on the basis of sports participation: A cross-sectional study

Sudip Naskar and BC Kapri

DOI: https://doi.org/10.22271/journalofsport.2024.v9.i2e.2987

Abstract
This cross-sectional study investigates the nutritional status of marginalized children aged 14-18 years, with a specific focus on the impact of sports participation. The study sample comprised 80 children, equally divided into sports participants and non-participants, and data were collected using anthropometric measurements, including BMI, waist girth, waist-hip ratio, and skinfold thickness. Descriptive statistics and t-tests were employed to analyze the data. The findings reveal a high prevalence of under nutrition in both groups, with 65% of sports participants and 72.5% of non-participants classified as underweight. While 32.5% of sports participants achieved a normal BMI, this proportion was lower among non-participants (22.5%). Additionally, 82.5% of sports participants exhibited a healthy waist-hip ratio (< 0.83), compared to 60% of non-participants, suggesting a lower risk of central obesity in the former group. No significant differences were observed in waist girth and BMI between the groups. However, the Muscle Bone Index was significantly higher among sports participants, indicating better musculoskeletal health. The study revealed mixed findings regarding the overall nutritional status between sports participants and non-participants among marginalized children. While no statistically significant differences were observed in most parameters, certain trends were evident. Sports participation benefits nutritional health, but interventions are needed to address under nutrition in marginalized children.

Keywords: Marginalized children, nutritional status, sports

1. Introduction

Motor Fitness refers to the ability of an athlete to perform successfully at their sport. The components of motor fitness are agility, balance, power, speed, reaction time etc. Motor fitness might be referred as an efficient performance in such basic requirements as running, jumping, dodging, climbing, swimming with sustained efforts in variety of situation and therefore, would involve such element as power, agility, speed, balance. “Motor fitness is the final criterion through which all other elements of physical fitness or total fitness are seen and measured in man. “(Book 1982). Importance of motor fitness can be described in these words that “motor fitness and competitive performance go hand in hand with athleticism”.

This study describes the nutritional status of sex workers children lived red-light areas in Kolkata in the state west Bengal, India, by the Durbar Samanwaya Committee, New Light, Sanlaap - a Non-governmental organization located in Kolkata. This study presents an exploratory examination of the physical and mental health of a “socially hidden” population, sex workers and their young children. While research on sex workers and their children is sparse, recent studies suggest that sex workers’ children living in brothels may be at risk for sexual exploitation and violence [1, 2]. Sex workers have been identified as a particularly vulnerable population for the infection and transmission of HIV and other sexually-transmitted illnesses [3], While sexual health and sexual risk behaviour remain critical issues that inform HIV prevention strategies, little is known about other physical and mental health issues of sex workers, and even less is known about the health of their young children [4].

Nutritional status plays a critical role in determining the growth, development, and overall health of children, particularly those from marginalized communities [5-9].

Malnutrition, encompassing both under nutrition and over nutrition, remains a significant global concern, disproportionately affecting vulnerable populations (UNICEF, 2023). Among marginalized children, factors such as poverty, limited access to education, and inadequate healthcare contribute to nutritional deficiencies and poor health outcomes (World Health Organization [WHO], 2023).

Sports participation is increasingly recognized as a potential strategy to improve physical and nutritional health among children. Regular physical activity has been shown to enhance body composition, increase musculoskeletal strength, and promote healthy growth patterns. Moreover, organized sports programs may provide additional benefits, such as fostering social inclusion and improving mental health, particularly for children facing socioeconomic challenges [5, 6, 10-12]. Despite these potential benefits, limited research has explored the specific impact of sports participation on the nutritional status of marginalized children. This study aims to address this gap by examining key nutritional indicators, such as Body Mass Index (BMI), Waist Girth, and Muscle Bone Index, to determine whether sports participation influences the overall nutritional status of children from marginalized communities.

2. Materials and Methods

The present study was used a purposive sampling method, selecting 80 male children aged 14 to 18 years from marginalized communities in Kolkata's red-light areas. The participants were divided into two groups: 40 children of sex workers residing with their mothers and not involved in any sports, and 40 children engaged in a sports intervention program facilitated by NGOs, residing in shelter homes or hostels. Data collected from Sonagachi, Rambagan, Sethbagan and Baruipur red-light areas in Kolkata in the state west Bengal, India, with support from organizations such as the Durbar Samanwaya Committee, New Light, and Sanlaap, all of which work with marginalized communities in Kolkata, West Bengal, India.

2.1 Research tools

Nutritional Status: Indirect Nutritional Testing

Anthropometry

- Shape of middle body part (Naval to Hips) waist hip ratio.
- BMI (Body Mass Index).
- Percentage Body Fat.
- Skinfold Thickness.
- Malnutrition Diseases.

In the present research work the variables selected for the study were measured with the help of following criterion measure as given in the table

Nutritional Status		Body Composition	Equipment's
		Height	**Anthropometer Rod or Stadiometer**
Physical Profile	Anthropometric Profile	Weight	Weight Machine
		Body Fat% (Eight Skinfold Site)	Anthropometric Assessment (ISAK)
		Body Mass Index	Weight in kg/height in meter^2
		Shape of Middle Body Part	Waist and Hip Circumference in cm

Results and Discussion

The data related to the children participated in the sports activities and non-sports participation belonging to the marginalized community were analyzed through appropriate statistical measure for their Nutritional Status. The description of the nutritional status of marginalized community children is presented below in the table.

Table 1: Descriptive statistics of nutritional status in marginalized community children based on sports participation

	N	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
		Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Waist	80	63.7388	8.26071	68.239	783	269	300	532
Waist Girth	80	.8073	05087	003	577	269	824	532
B.M.I.	80	17.8025	3.24189	10.510	1.328	269	1.971	532
Sum 8 Skinfolds	80	69.2162	23.78606	565.777	1.517	269	1.700	532
Muscle Bone Index	80	4.8470	6.67855	44.603	8.835	269	78.684	532

The descriptive statistics highlight the nutritional status of 80 marginalized community children engaged in sports participation. The mean waist circumference was 63.74 cm (SD=8.26), with a variance of 68.24, indicating moderate variability. B.M.I. had a mean of 17.80 (SD=3.24), with a variance of 10.51, reflecting a relatively homogenous group. The Sum of 8 Skinfolds (Mean=69.22, SD=23.79) reflects substantial variability, indicating diverse fat distribution among participants. Skewness (1.517) and Kurtosis (1.700) suggest a moderately positively skewed and peaked distribution. The Muscle Bone Index (Mean=4.85, SD=6.68) shows significant variance (44.60), highlighting variability in musculoskeletal health. These findings emphasize heterogeneity in body composition, potentially influenced by nutritional status, physical activity levels, and socio-environmental factors, suggesting slight asymmetry in some variables. Kurtosis values, mostly near zero, indicate a normal distribution for most metrics. These findings provide a comprehensive overview of body composition and highlight key areas for potential intervention through sports-based programs.

The t-test analysis for Waist shows no significant difference between sports participants, with T=0.687 and $p>0.05$. Similarly, Waist Girth shows no significant difference ($t=-1.736$, $p>0.05$), with minimal variation in means. For BMI, no significant difference was found ($T=0.467$, $p>0.05$), with comparable mean values for participants (17.97) and non-participants (17.63). These findings suggest that sports participation did not significantly impact these parameters. The table presents a t-test analysis comparing the nutritional status indicators of marginalized community children based on sports participation. Sum of 8 Skinfolds: No significant difference was observed between sports participants and non-participants ($T=-0.489$, $p>0.05$), despite a higher mean for non-participants (70.52) compared to participants (67.91). Muscle Bone Index: A significant difference was noted (T=0.796, $p<0.05$), with sports participants (Mean=5.44) having higher values than non-participants (Mean=4.25).

These results suggest that while sports participation may positively influence musculoskeletal health, its impact on fat distribution.

Table 2: T-test of nutritional status in marginalized community children based on sports participation

Group Statistics										
	Groups	**T-Statistics**	**DF**	**One-Sided P**	**Two-Sided P**	**Mean**	**Std. Deviation**	**Std. Error Mean**	**Mean Difference**	**Std. Error Difference**
Waist	Sports Participants	.687	78	247	494	64.3750	7.90867	1.25047	1.27250	1.85336
	Non-sports participants	.687	77.379	247	494	63.1025	8.65165	1.36795	1.27250	1.85336
Waist Girth	Sports Participants	-1.736	78	043	086	7975	03692	00584	-.01950	01123
	Non-sports participants	-1.736	64.386	044	087	8170	06069	00960	-.01950	01123
B.M.I.	Sports Participants	467	78	321	642	17.9725	2.83476	44822	34000	72852
	Non-sports participants	467	73.652	321	642	17.6325	3.63236	57433	34000	72852
Sum 8 Skinfolds	Sports Participants	-.489	78	313	626	67.9100	20.56202	3.25114	-2.61250	5.34453
	Non-sports participants	-.489	73.064	313	626	70.5225	26.82841	4.24194	-2.61250	5.34453
Muscle Bone Index	Sports Participants	796	78	214	428	5.4427	9.45008	1.49419	1.19150	1.49684
	Non-sports participants	796	39.278	215	431	4.2513	.56372	.08913	1.19150	1.49684

Table 3: Waist girth and waist girth ratio indicator of nutritional status in marginalized community children based on sports participation

Variable	**Measurement Category**	**Children participated in sports**	**Percentage**	**Number of non-sports participate children's**	**Percentage**
Waist Girth	Within Healthy Range (70-90 cm)	9	22.5%	9	22.5%
	Below Healthy Range (70-90 cm)	31	77.5%	31	77.5%
Waist Hip Ratio	Within Healthy Range<0.83	33	82.5%	24	60%
	Hip Ratio Risk Range >0.83	7	17.5%	16	40%

The data reveals significant insights into waist girth and waist-hip ratio among marginalized community children participating in sports versus non-participants:

- **Waist Girth:** Only 22.5% of children in both groups fall within the healthy range (70-90 cm), while the majority (77.5%) fall below the healthy range, indicating a potential issue with under nutrition or growth impairments.
- **Waist-Hip Ratio:** Among sports participants, 82.5% are within the healthy range (< 0.83), compared to only 60% of non-participants. Conversely, 17.5% of sports participants and 40% of non-participants exceed the risk threshold (> 0.83), suggesting a lower risk of central obesity for those engaged in sports.

These findings underline the potential benefits of sports participation in maintaining healthier waist-hip ratios while highlighting widespread under nutrition in this population.

Table 4: B.M.I status of nutritional status in marginalized children based on sports participation

B.M.I. Category	**Number of sports participant children**	**Percentage**	**Number of non-sports participate children's**	**Percentage**
Underweight	26	65%	29	72.5%
Normal Weight	13	32.5%	9	22.5%
Overweight/Obese	1	2.5%	2	5%

The analysis of B.M.I. categories highlight critical differences between sports participants and non-participants:

- **Underweight:** A significant proportion of children in both groups fall into the underweight category, with 65% of sports participants and 72.5% of non-participants, indicating widespread under nutrition.
- **Normal Weight:** Sports participants show a higher proportion (32.5%) of children with normal B.M.I. compared to non-participants (22.5%), suggesting a potential positive impact of sports participation on maintaining a healthier weight.
- **Overweight/Obese:** The prevalence of overweight/ obesity is low in both groups, with 2.5% of participants and 5% of non-participants, reflecting limited issues with excessive weight in this population.

These results emphasize the need for targeted nutritional interventions while underscoring the potential role of sports in promoting healthier B.M.I. levels.

Conclusions

The children of sex workers also have multiple health problems, with clinical assessments showing about half of the children having parasites, dental problems and nutritional deficiencies [4]. Sports participation demonstrated a positive influence on certain aspects of nutritional status, particularly musculoskeletal health and a healthier Waist-Hip Ratio. However, no significant differences in B.M.I. or Waist Girth highlight the persistent issue of under nutrition in marginalized children. This underscores the need for integrated strategies that combine sports participation with nutritional interventions to improve the overall health and well-being of this vulnerable population.

Acknowledgments

We sincerely would like to thank the NGOs Sanlaap, Durbar Mahila Samanwaya Committee (DMSC), New Light, and the Institute of Psychological and Educational Research (I.P.E.R.) for their invaluable support and guidance throughout this research. Their collaboration and commitment were instrumental in facilitating this study and ensuring its

successful execution.

Conflict statement
The authors confirm that they have no financial or personal conflicts of interest that could have influenced the work presented in this paper.

Funding statement
The study, including its design, data collection, and submission, was entirely self-funded by the author. No external funding was received. The author assumes full responsibility for the content of this publication.

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