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Research Article

Health and Nutritional Status of Sugali and Yanadi Tribes of Rayalaseema Region, Andhra Pradesh

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Abstract

In the present study the association of anthropometric indicators with functional ability was assessed among the Sugali (n=297) and Yanadi (n=297) tribes of Rayalaseema region, Andhra Pradesh aged >60 years in a cross sectional design. More than quarter to half of the sample from both communities was noticed with under nutrition. Nutritional anthropometry and functional ability was superior in women than men in both the groups. In both tribes indicators of anthropometry and functional ability, tend to decrease with age ($p<0.05$). In both males and females of Sugali tribe the mean values of Activities of Daily Living (ADL), Mobility Index (MI), Well Being (WB) tend to decrease from normal weight to underweight category ($p<0.05$). In Yandi males none of the functional ability indicators shown significant difference between underweight and normal weight categories, on the other hand, only ADL and MI significantly decreased in underweight category ($p<0.05$). Around 40 percent of the elderly reported with different health problems. In both Sugalis and Yanadis, normal weight people were 1.05 to 1.07 times better towards ADL when compared underweight people ($p<0.05$). Normal weight people were 1.2 times better towards MI than underweight people in both tribes. Similarly normal weight people were 1.17 times (95% CI: 1.001, 1.362) to 1.2 times (95% CI: 1.058, 1.363) better towards their WB when compared to underweight people ($p<0.05$). In conclusion, the results of the present study highlighted that BMI and other anthropometric indicators were significant predictors of functional ability among the elderly. Hence improving nutritional status among the elderly will be beneficial to improve the functional ability during old age.

Keywords: Elderly; Health and nutritional status; Anthropometry; Tribes; Andhra Pradesh

Introduction

Population ageing is poised to become one of the most significant social transformations of the twenty-first century [1]. Between 2015 and 2050, the proportion of the world's population over 60 years will nearly double from 12% to 22%. By 2050, 80% of older people will be living in low- and middle-income countries. In the coming decades, many countries are likely to face fiscal and political pressures in relation to public systems of health care and social protections for a growing older population. India too, the number is escalating with about 7.7% of the total population being elderly. Hence, the health status of the elder population has a significant impact on the development of the country [2].

Widespread prevalence of undernutrition and infectious diseases are the health challenges in many developing countries including India [3]. The root causes of undernutrition and infectious diseases are poverty, poor hygienic conditions and little access to preventive health care facilities [4]. With increasing age, both lean body mass and basal metabolic rate declines leading to impair the energy balance vis-à-vis disease prevalence. Since nutrition of the elderly affects immunity as well as functional ability, it is an important component of elderly care that warrants further attention [5]. Hence assessing nutritional status of population has gained importance with a view to understand the health and socioeconomic patterns of the populations [6].

Anthropometry is one that is generally used for measuring the magnitude of malnutrition (undernutrition and overnutrition) at both individual and population level [7]. It is visualized that BMI may be more nutritionally than genetically related, despite a wide variation between human populations in weight and height [8,9]. Other anthropometric indicators such as waist circumference and Waist-hip Ratio (WHR) are regarded as alternatives to BMI, as fat in the abdominal region is associated with increased health risks [10]. Thus anthropometric indicators of nutritional status may be more appropriate in a country with ethnic groups like India. The existing literature indicates anthropometric indicators of nutritional status are concerned with adults and data on elderly populations is sparse that too studies are not available on tribal populations. In the light of this background an attempt has been made in the present study to assess health and nutritional status of the elderly of Sugali and Yanadi tribes of Rayalaseema region of Andhra Pradesh.

Sugali: Sugali is a nomadic tribe distributed throughout India and inhabit in plains, with a unique culture and common characteristics such as physical features, language, habits, cultural homogeneity, unifying social organization and habits. The literacy rate among Sugali is 49.0% [11].They are traditionally transporters of goods like salt, grains and firewood and experts in cattle rearing and selling milk and milk products. In the recent past they use to undertake agriculture and some are working in government sectors. The total population according to 2011 census is 24,07,637, among 12,31,006 are males and 11,76,631 are females. Sugali population in Rayalaseema region is 1,83,044, among 94,276 are males and 88, 768 are females [11].

Yanadi: Yanadi is a indigenous tribe who are rodent eating community with nomadic way of life, predominantly distributed in the Rayalaseema region and Nellore district of Andhra Pradesh.

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The literacy rate among Yanadi is 40.8% as per 2011 census [11]. Traditional occupation of Yanadi is fishing, besides this they use to involve in other petty occupations According to 2011 census reports the total Yanadi population is 5,37,808 among 2,72,203 are male and 2,65,605 are female in Andhra Pradesh. Yanadi population in Rayalaseema region is 59,756, among 29,934 are males and 29,822 are females [11].

Subjects and Methods

The study population comprised 297 apparently healthy elderly population (>60 years) each from Sugali (Males: 137; Females: 160) and Yanadi (Males: 134; Females: 163) tribes of Rayalaseema region of Andhra Pradesh, India. The average age of the Sugali tribe males and females were 72.15 ± 6.64 and 69.15 ± 6.36 and Yanadi tribe males and females were 68.90 ± 5.73 and 67.80 ± 6.19 respectively. Subjects were classified into three age groups: 60 to 69, 70 to 79 and ≥ 80 years.

The population size of Sugali tribe in Rayalaseema region is 1,83,044 and Yanadi tribe is 1,22,617 (2011 census) [11]. According to 2016 report by Ministry of Statistics and Programme Implementation, India [12], elderly population >60 years size is 8.5 percent. No specific tribal related elderly percentage is available in India. Taking the country elderly average in to consideration, the elderly size in Yanadi tribe would be 10,423. Based on the previous publications 1 it is assumed that around 15 percent would represent good SRH, with 95% class interval and 4 percent standard error, the sample size required to ascertain the hypothesis would be 300. In Rayalaseema four districts were there, and each district was considered as one unit. In each unit, three revenue divisions were there, one division was picked randomly. In each revenue division 22 mandals were there. 10 mandals were randomly picked. Each mandal was surveyed for recruitment. First come first person with >60 years, who is willing to provide consent and data is recruited. The exclusion criteria was subjects with gross abnormality and bedridden. The study was approved by the ethics committee of our Institute. Informal consent was taken from all the subjects before participation. A common protocol was adapted from the Food Habits in Later Life (FHILL) and contents were translated into local language "Telugu" and utilised in the collection of the data. Information on individual's demography, health history along with data on health aids (spectacles, hearing, walking and dentures) was procured.

The physical assessment included height, weight, Waist Circumferences (WC) and Mid Upper Arm Circumferences (MUAC), Skin Fold Thickness (SFT) at triceps, subscapular and abdominal as specified Reddy et al. [13] Body Mass Index (BMI) was calculated as weight in kg/height in metre^2 (kg/m^2). Sum of the SFT was obtained adding triceps + subscapular + abdominal SFT.

Self-rated health

As a part of general structured interview conducted in the subject's own home, several questions were asked about SRH, Activities of Daily Living (ADL), Memory and Cognitive Function (MCF) and Well-Being (WB). SRH was evaluated using the response to the question, "How would you rate your health at the present time?" with possible responses being poor, fair, good or excellent [14]. The last two categories were combined and labelled as good, due to the limited sample size in the excellent category for the present study.

Activities of daily living

Physical function was assessed using an instrument adapted from the WHO 11 Country Study [15].The 15-itemquestionnaire is as follows; a) walk between rooms b) use stairs c) walk at least 400 meters d) get to places out of walking distance [e.g., bus stop, shops] e) use the toilet) wash and bathe yourself g) dress and undress h) take care of your appearance I) get in and out of bed j) do your own cooking k) feed yourself l) do light house work m)do heavy house work n) take medicine by yourself o)manage finances. These questions included about physical functional limitations (item a-d), basic activities of daily living including self-care (items e-k), and instrumental activities of daily living (items i-o). For each item, the level of competence was measured on a four-point scale. Degree of difficulty scores were assigned to categories defined in terms of the ability to perform an activity within a numerical range from one to four. A score of one denoted that the subject was unable to perform the activity, whereas a score of four indicated that the subject could accomplish the activity without any difficulty. The other two possible responses indicated the ability toper form activities only with outside help (score=2) and with difficulty, but without help (score=3). The aggregates cores on the ADL questions rated from 15 to 60. From the ADL questions, a Mobility Index (MI) was calculated as the sum of items a-d, established on a model used in the Euro nut Survey in Europe on Nutrition and the Elderly, Concerted Action (SENECA) Study on Nutrition and the Elderly [16]. Scores ranged from 4 to 16 with higher scores indicating better mobility.

Well-being

In addition to physical function, WB was included to help describe the subject's emotional status [17]. Well-being was measured by a seven-item, binary-coded, closed-ended questionnaire [18]. Item scores were summed to develop the WB index with aggregate scores ranging from 7 to 14, with higher scores indicating a higher sense of WB. Questions were recorded so that a positive answer was indicated by a higher score (e.g. "Do you worry more than usual about little things?' Yes=1; No=2 and "Do you laugh easily? No=1; Yes=2). The questions included were as follows: Do you worry more than usual about little things?; Have you lost interest in doing things you usually cared about or enjoyed in the past?; Have you ever felt so sad or depressed that you thought you wanted to die?; Do you feel tired most of the time?; Are you happy with every day of your life?; Do you laugh easily?; Do you enjoy listening to music?

Memory and cognitive function

MCF was measured by a five item questionnaire. Item scores were summed to develop the MCF index with aggregate scores ranging from 5 to 10, with higher scores indicating a higher sense of MCF. The questions included were as follows: What year is it (now)?; What month is it (now)?; What day or date of the month is it (now)?; What is your address?; Do you forget where you left things more than you used to or forget the names of close friends or relatives?

Statistical analysis was carried out via SPSS-16.1 and alpha levels were set at $P<0.05$. Differences in mean values between sexes were analysed using the students "t" test and differences within age groups and categories of SRH were checked by analysis of variance. Bivariate relationships between SRH with anthropometry and other factors using Pearson correlation coefficients. Further, multivariate logistic regression was fitted to investigate the relationships that affect an individual SRH. The variables entered into the model were: BMI, MUAC, skin fold measurements, and scores of MI, ADL, and WB and MCJ controlled for age and sex.

Results

More than quarter to half of the sample from both communities

was noticed with undernutrition (Table 1). The perception level of poor SRH was greater in both communities than good SRH. Yanadi elderly were sent percent illiterates while a meagre portion of the Sugali population (3%) attained education to the level of primary.

Yanadi males possess higher levels of waist circumference, triceps SFT, subscapular SFT, abdominal SFT, sum of the SFT, WB and MCF than to their Sugali male counterparts ($p<0.05$). Similarly Yanadi females possess significantly higher levels of skin fold measurements at triceps, subscapular, abdomen and sum of the SFT and MCF than to their Sugali female counterparts ($p<0.05$). Body mass index, MUAC, ADL and MI failed to exert differences between tribes (Table 2).

To understand the trend of changes in anthropometry and functional ability with age, we performed Bivariate association analysis for the both the tribes and the r values were shown in Table 3. In both males and females of Sugali tribe, all the indicators of anthropometry and functional ability, tend to decrease with age ($p<0.05$) except WC in females. On the other hand in both males and females of Yanadi tribe only BMI, and WC, MUAC (females), TSFT (females), and the indicators of functional ability tend to decrease with advancement of age ($p<0.05$).

In order to assess changes in the activities of daily living across the body mass index grading, we have performed independent 't' test and the results were shown in Table 4 and 5 for Sugali and Yanadi tribe respectively. In both males and females of Sugali tribe the mean values of ADL, MI, WB (females) tend to decrease from normal weight to underweight category ($p<0.05$). MCF failed to exert difference between genders. In Yandi males none of the functional ability indicators shown significant difference between underweight and normal weight categories, on the other hand, only ADL and MI significantly decreased in underweight category ($p<0.05$).

Among the Yanadi tribe more than three quarters of the males and 63 percent of the females reported with no health problems, while corresponding figures for Sugali elderly was around 50 percent only (Table 6). High blood pressure was recorded to an extent of 19 percent in Sugali males and the same was 16 percent in females. In contrary high blood pressure was minimal in Yanadi males while it was 14 percent in females respectively. Arthritis takes highest toll in Sugali males (21%) while it was 11 percent in females. The problem of arthritis was recorded to an extent of 10 to 13 percent in Yanadi males and females. Diabetes was more in Sugali males (8%) and 5 percent in females. Diabetes was 1 percent in Yanadi males and 4 percent in females. Chest problems were recorded to an extent of 4 to 7 percent in Sugali elderly and the corresponding figures in Yanadi elderly were 4 to 2 percent only. The prevalence of heart problems were around 1 percent in both the tribes and only 3 cases suffered with cancer related problems in Yanadi females.

Table 1: Demographics and health status of Sugali and Yanadi tribes.

Variable	Tribe			
	Sugali		Yanadi	
	Male (N=137) n (%)	Female (N=160) n (%)	Male (N=134) n (%)	Female (N=163) n (%)
Age Code				
60-69	48 (35.0)	107 (66.9)	72 (53.7)	108 (66.3)
70-79	67 (48.9)	37 (23.1)	54 (40.3)	40 (24.5)
80-89	22 (16.1)	16 (10.1)	8 (6.0)	15 (9.2)
SRH				
Poor	38 (27.7)	40 (25.0)	21 (15.7)	41 (25.2)
Fair	90 (65.7)	88 (55.0)	104 (77.6)	99 (60.7)
Good	9 (6.6)	32 (20.0)	9 (6.7)	23 (14.1)
Body Mass Index				
Under Weight	81 (59.1)	53 (33.1)	59 (44.0)	46 (28.2)
Normal Weight	56 (40.9)	107 (66.9)	75 (56.0)	117 (71.8)
Education status				
Illiterates	132 (96.4)	156 (97.5)	134 (100.0)	163 (100.0)
Primary	4 (2.9)	4 (2.5)	-	-
Secondary	1 (0.7)	-	-	-

Binary logistic regression model was performed to assess the effect of anthropometry on functional ability for both the tribes upon adjusting age and sex (Table 7). In both Sugalis and Yanadis, normal weight people were 1.05 to 1.07 times better towards ADL when compared underweight people ($p<0.05$). Normal weight people were 1.2 times better towards MI than underweight people in both tribes. Similarly normal weight people were 1.17 times (95% CI: 1.001, 1.362) to 1.2 times (95% CI: 1.058, 1.363) better towards their WB when compared to underweight people ($p<0.05$). MCF failed to exert difference between normal weight and underweight categories in both the tribes.

Discussion

Significant findings of the present study were prevalence of undernutrition, poor self related health and decreased functional ability among the elderly of both the tribes. Since no comparative data is available from the tribal elderly, the results of the study were compared with adult tribal and nontribal groups. In the present study women of the both the tribal groups were comparatively better in terms of their nutritional status when compared to men. The mean body mass index of the Sugali and Yanadi tribes were on par with other tribal groups of Orissa [19] and Northeast India [20,21] and significantly lower to the rural population of Andhra Pradesh [13].

Nutritional status as indicated by anthropometry largely failed to differentiate between the tribes, however women comparatively better in terms of nutritional status than men. This was supported by our earlier studies on the people of Tirupati elderly [13]. Research studies on elderly have shown varying degrees of relationship between different anthropometric measures and age. Comparison of our anthropometric data with similar age groups of elsewhere populations, it is noticed that tribal elderly nutritional status was lower even to caste communities of India [22]. Almost overweight and obesity was absent among the tribal elderly, on the other hand around 50 percent of men and 30 percent of women were suffering from underweight. This clearly indicates the nutritional vulnerability among the tribal elderly. Though fat deposition as indicated by skin fold measurements was better in Yanadi tribe, but these levels were below the recommended dietary allowances of ICMR [23]. In general body mass index reflects the nutritional status, which is poorer than other population groups [24]. The biological and social consequences of low BMI have been well established (WHO, 1995). Low work capacity and work productivity, high morbidity and mortality are all associated with low BMI [25].

Results of correlation analyses indicates age was significantly negatively correlated with anthropometric indicators and functional ability in both sexes of the both the tribes and our results were in good agreement with the findings of Ghosh et al. [26] In both communities, BMI resulted to be significantly correlated to SRH. Subjects whose BMI levels were higher perceived their SRH as good. The significant interaction between BMI and SRH at later stages of life is already reported by Reddy et al. [13] that subjects with good/fair SRH tended not to have problematic BMI, while in the poor-SRH category 55% of males and 47% of females were below 19 units of BMI.

Table 2: Mean values for anthropometry and functional ability among Sugali and Yanadi tribes.

Variable	Sugali		Yanadi	
	Male (n=137)	Female (n=160)	Male (n=134)	Female (n=163)
BMI	18.34 ± 2.29	19.90 ± 2.86	18.74 ± 2.25	20.08 ± 2.47
MUAC	21.61 ± 2.73	21.64 ± 2.64	21.84 ± 2.36	21.80 ± 2.56
WC	69.55 ± 7.56	69.46 ± 9.32	71.84 ± 7.23*	70.54 ± 7.68
HC	81.20 ± 7.49	83.43 ± 10.76	84.60 ± 6.43*	85.29 ± 7.33
WHR	0.86 ± 0.04	0.83 ± 0.04	0.85 ± 0.03	0.83 ± 0.04
Triceps SFT	4.61 ± 1.73	5.99 ± 2.31	6.16 ± 2.23*	7.93 ± 2.66@
Sub scapular SFT	42.83 ± 13.33	52.18 ± 16.02	54.81 ± 15.20*	64.94 ± 17.61@
Abdominal SFT	7.28 ± 2.66	8.72 ± 2.92	9.26 ± 2.87*	10.52 ± 2.97@
Sum of the SFT	54.72 ± 17.16	66.90 ± 20.57	70.23 ± 19.67*	83.39 ± 22.68@
SRH	1.79 ± 0.55	1.95 ± 0.67	1.91 ± 0.47*	1.89 ± 0.62
ADL	47.20 ± 7.72	47.02 ± 8.71	46.54 ± 6.55	45.86 ± 7.43
MI	11.01 ± 3.09	12.06 ± 3.24	11.59 ± 2.96	11.90 ± 2.95
WB	9.76 ± 1.94	9.86 ± 1.89	10.35 ± 1.48*	10.21 ± 1.70
MCF	7.61 ± 1.43	7.11 ± 1.16	7.98 ± 1.04*	7.80 ± 0.93@

*p<0.05 (difference between males)

@p<0.05 (difference between females)

Table 3: Bivariate relationship of anthropometry and functional ability with age in Sugali and Yanadi tribes.

Variable	Age			
	Sugali		Yanadi	
	Male (n=134)	Female (n=160)	Male (n=134)	Female (n=163)
BMI	-.313*	-.265*	-.203*	-.253*
MUAC	-.405*	-.306*	-0.164	-.193*
WC	-.210*	-0.143	-.174*	-.194*
TSFT	-.169*	-.191*	-0.069	-.212*
SSFT	-.281*	-.246*	-0.066	-0.111
ASFT	-.285*	-.217*	-0.054	-0.01
Sum of the SFT	-.279*	-.243*	-0.066	-0.112
ADL	-.634*	-.445*	-.400*	-.568*
MI	-.775*	-.724*	-.661*	-.733*
WB	-.344*	-.375*	-.445*	-.576*
MCF	-.283*	-.291*	-.407*	-.500*

*p<0.05

Table 4: Descriptive statistics for functional ability according to nutritional status in Sugali tribe.

		Under Weight (Male 81; Female 53)	Normal Weight (Male 56; Female 107)	F	P
ADL	Male	46.07 ± 7.94	48.8 ± 7.15	2.07	0.04
	Female	43.26 ± 9.24	48.88 ± 7.83	4.02	0
MI	Male	10.46 ± 2.93	11.82 ± 3.16	2.6	0.01
	Female	11.13 ± 3.31	12.51 ± 3.11	2.59	0.01
WB	Male	9.57 ± 2.02	10.04 ± 1.79	1.39	0.17
	Female	9.30 ± 1.94	10.14 ± 1.81	2.69	0.01
MCF	Male	7.69 ± 1.43	7.50 ± 1.41	0.77	0.44
	Female	6.85 ± 1.26	7.23 ± 1.08	2	0.48

Table 5: Descriptive statistics for functional ability according to nutritional status in Yanadi tribe.

		Under Weight (Male 59; Female 46)	Normal Weight (Male 75; Female 117	F	P
ADL	Male	45.85 ± 6.88	47.09 ± 6.26	1.09	0.28
	Female	43.15 ± 8.80	46.92 ± 6.56	2.99	0
MI	Male	11.15 ± 2.75	11.93 ± 3.08	1.53	0.13
	Female	10.46 ± 2.85	12.47 ± 2.81	4.11	0
WB	Male	10.15 ± 1.50	10.51 ± 1.46	1.38	0.17
	Female	9.91 ± 1.66	10.33 ± 1.70	1.43	0.16
MCF	Male	8.05 ± 1.04	7.92 ± 1.04	0.72	0.47
	Female	7.61 ± 0.88	7.87 ± 0.94	1.63	0.1

Table 6: Data on self reported chronic conditions among the elderly subjects [expressed as number (%)].

Condition	Tribe			
	Sugali		Yanadi	
	Male (n=137)	Female (n=160)	Male (n=134)	Female (n=163)
Nil	62 (45.26)	95 (59.38)	102 (76.12)	105 (64.42)
High blood pressure	26 (18.98)	26 (16.25)	8 (5.97)	24 (14.72)
Arthritis	28 (20.44)	18 (11.25)	14 (10.45)	22 (13.50)
Tb/ Asthma/ lung prob.	7 (5.11)	10 (6.25)	6 (4.48)	3 (1.84)
Diabetes	12 (8.76)	9 (5.63)	2 (1.49)	7 (4.29)
Heart disease	2 (1.46)	2 (1.25)	2 (1.49)	2 (1.23)
Tumors & lesions	0 (0.0)	0 (0.0)	0 (0.00)	0 (0.0)

Table 7: Sex adjusted binary logistic regression model to predict the effect of functional ability on nutritional status.

		OR	P	CI
ADL	Sugali	1.067	0	1.035, 1.101
	Yanadi	1.052	0	1.016, 1.089
MI	Sugali	1.15	0	1.064, 1.243
	Yanadi	1.176	0	1.081, 1.279
WB	Sugali	1.201	0.01	1.058, 1.363
	Yanadi	1.168	0.05	1.001, 1.362
MCF	Sugali	1.066	0.5	0.887, 1.282
	Yanadi	1.071	0.58	0.838, 1.368

Sex adjusted

Functional ability between the two tribes was insignificant. The functional ability of the elderly was very poor in the Sugali and Yanadi elderly and our results were in good agreement with other population groups [13]. Many studies documented a decline in ADL and other interactions with advancing age as noticed in the present investigation [27]. Research studies have convincingly highlighted that ADL can be used to predict morbidity and mortality in elderly subjects. Further, the proportion of individuals craving for independence was slightly higher for males than for females, as evidenced in the Seneca Study of European elderly [16]. Self-assessment of health was largely dependent on an individual's functional ability and psychological processes, as evaluated by analysis of life satisfaction [28].

Logistic regression demonstrates that subjects with high scores on functional ability perceived their body mass index superior to those who had lower scores. Therefore, for the elderly people, an individual evaluation of health is substantially influenced by his or her level of emotional WB and physical function. Similar reports were available in elsewhere population groups [29].Functional ability were the strongest predictors of individual nutritional status [30]. Research findings reported that the subjects exhibited increased concern with respect to posing a burden to their families and expressed to lead independent lives [31]. Since the Indian culture is entirely different from Western cultures, maintaining independence is not rooted in the minds of the elderly particularly in tribal's who automatically enjoy the dependency on the nearest kin, especially during old age.

In conclusion, the results of the present study highlighted that BMI and other anthropometric indicators were significant predictors of functional ability among the elderly. Hence improving nutritional status among the elderly will be beneficial to improve the functional ability during old age. Strategies of prevention should be focused mainly on relieving the burden of malnutrition and daily life limitations.

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