

6. A Study of Body Mass Index and Respiratory Illness among the Housewife's - A Cross Sectional Study

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Abstract

The health needs of the women are often ignored in the family and because of that many women's suffers from health problems. Indian women have low level of education and participation in formal labor. Indian women typically have little sovereignty, living under the control of first on their fathers, then their husbands, and finally their sons. All of these factors have a negative impact on their health status. In this cross sectional descriptive study sample size was randomly selected. The study of human participants was carried out according to ICMR guidelines 2006. Anthropological measurement like height, weight, BMI and PEFr were recorded by standard protocol. Demographic profile of Group I and II. Group I shows the 3.3% illiterate subject while it was 8.3% in Group II. In the both group shows the high percentage of open category of females as compared with OBC, SC and ST. BMI category according to age group in Group-I and Group-II. In Group-I 8.33% underweight, 50% normal, 8.33% overweight and 8.33% obese where in Group-II it was 41.67%, 30%, 20% and 8.33% respectively. In group I the PEFr value was significantly decreased above to below. Similarly, in group II the PEFr value was significantly increase above to below as compare with BMI category. In the present study, the prevalence of overweight and obese category was 60% and 80% respectively. The present study concluded that the almost all the female suffer from blood pressure. The predominantly cardio respiratory fitness depends on the physical fitness index and the respiratory problem are more significantly observed in the entire group. Respiratory rate was reduced in group I and increased in group II. All age group showed normal BMI category and normal pulse rate but decreased peak expiratory flow rate among females showed that respiratory illness. Health status, Demographical profile, BMI and PEFr

Introduction

The rapid spread of modernization, growing urbanization and consequent change in family structure there has been change the health status of women's. Empowerment of women is an active and multidimensional process enabling women to understand their full identify and potential in every sphere of life (Sravanakumar and Varakumari, 2019). The health needs of the women are often ignored in the family and because of that many women's suffers from health problems. According to WHO depression is going to be the second biggest heath problem and leading cause of disability and death word-wide second to cardio-vascular disease(Lopez & Murray, 1998)

According to the latest Global burden of disease study and World Health Organization (WHO) pre mature deaths attributable to house hold air pollution (HAP) various between 2.6 and 3.8 million. The health of Indian women is intrinsically linked to their status in society. Research on women's status has found that the contributions Indian women make to families often are overlooked, and instead they are viewed as economic burdens. Indian women have low levels of both education and formal labour force participation. They typically have little autonomy, living under the control of first their fathers, then their husbands, and finally their sons. All of these factors exert a negative impact on the health status of Indian women. Finally, a woman's health affects the household economic well-being, as a woman in poor health will be less productive in the labour force (Kamalapur and Reddy; 2013).

1.1 Determinants of Women's Health

Health status is influenced by complex biological, social, and cultural factors that are highly interrelated. These factors affect men and women differently. Biological and social factors affect women's health throughout their lives and have cumulative effects. Therefore, it is important to consider the entire life cycle when examining the causes and consequences of women's poor health (Tinker *et al.*, 2000).

1.2 The Status of Women

The consequences of women's unfavorable status in India include discrimination in the allocation of household resources, such as food, and in access to health care and education as well as marriage at young ages. The loss of a husband usually results in a significant decline in household income, in social marginalization, and in poorer health and nutrition (Improving Women's Health in India; 1996).

1.3 Women's Health in India

Women constitute a significant part of the work force in India. The work participation rate continues to be substantially less for females than for males. Majority of the women workers are employed in the rural areas. Among rural women workers 87 per cent employed in agriculture are laborers and cultivators, about 80 per cent are employed in unorganized sectors like household industries, petty trades and services, building construction etc.

Women are treated differently from men in society generally because of gender inequality resulting in, for example, violence against women and sexual assault. Women are also treated differently within the health system. Women have frequently been excluded from being health and medical research participants leading to major gaps in knowledge about women's health (Women Health NSW; 2007).

1.4 Review of Literature

The body mass (weight) and the height of an individual are the attributes used to derive Body Mass Index (BMI) or Quetelet Index. BMI is a simple, inexpensive, and noninvasive surrogate measure of body mass. Several studies have investigated the impact of BMI on lung function and respiratory diseases, emphasizing that both high and low BMI can negatively affect pulmonary health. Obesity is associated with respiratory impairments due to increased adipose tissue, which restricts lung expansion and reduces pulmonary compliance. According to Chen et al. (2014), excessive body fat accumulation exerts mechanical pressure on the diaphragm, leading to decreased lung functions, and an increased risk of conditions. Puhon et al. (2012) found that, obese individuals had a significantly higher prevalence of asthma and breathlessness compared to those with normal BMI. Sood et al. (2019) reported that, women with obesity had a 60% higher risk of developing chronic respiratory symptoms. Under nutrition leads to muscle wasting, including the loss of respiratory muscle mass, reduced lung function. Gupta et al. (2017) found that underweight individuals exhibited reduced oxygen transport capacity and were more susceptible to respiratory infections. Malnutrition weakens the immune system, making individuals more prone to tuberculosis (TB) and pneumonia (Mukherjee et al., 2021). Indoor air pollution is a significant contributor to respiratory morbidity among housewives, especially in developing nations. Balakrishnan et al. (2013) emphasized that exposure to biomass fuel smoke increases the risk of COPD, asthma, and chronic bronchitis. Parikh et al. (2015) observed that prolonged cooking in poorly ventilated kitchens is associated with higher incidences of

wheezing, shortness of breath, and persistent cough. A peak flow meter is a portable, inexpensive, hand-held device used to measure how air flows from your lungs in one "fast blast." In other words, the meter measures your ability to push air out of your lungs. Peak flow meters come in two ranges to measure the air pushed out of your lungs. A low range peak flow meter is for small children, and a standard range peak flow meter is for older children, teenagers, and adults. An adult has much larger airways than a child and needs the larger range. There are several types of peak flow meters available. Talk to your healthcare provider or pharmacist about which type to use. A study by Desai et al. (2018) on Indian housewives found that those exposed to firewood and kerosene fumes had a threefold higher risk of respiratory symptoms compared to women using liquefied petroleum gas (LPG). Sedentary behavior and dietary imbalances contribute to obesity-related respiratory disorders among housewives. Chakraborty et al. (2020) highlighted that housewives with limited physical activity had a higher BMI and increased breathlessness. Conversely, those from low-income backgrounds often suffered from undernutrition, further compromising lung function (Das et al., 2018). Chronic stress and mental health issues can exacerbate respiratory conditions. Choudhary et al. (2020) found a significant correlation between stress-related eating behaviors, BMI fluctuations, and respiratory symptoms among housewives. Stress-induced obesity is linked to increased systemic inflammation, which aggravates respiratory illnesses (Sharma & Patel, 2019). Access to healthcare and socioeconomic status play crucial roles in the prevalence and management of respiratory illnesses. Socioeconomic disparities often prevent housewives from receiving timely medical intervention. Mukherjee et al. (2021) found that low-income women had a higher prevalence of untreated respiratory conditions due to lack of awareness and financial constraints. In many societies, women's health is often deprioritized, leading to undiagnosed and untreated conditions. Bhatia et al. (2019) emphasized that cultural norms frequently discourage women from seeking medical help for chronic respiratory symptoms, which can result in disease progression.

1.5 Objective of Study

- To monitoring of physical fitness among the rural and urban housewife of Kolhapur District, Maharashtra
- To study the respiratory health of rural and urban housewife's.

We aimed to compare the quality of life of urban women's with rural community women's in Ichalkaranji and Takawade.

Material and Methods

2.1 Study Area

2.1.1 Site I (Ichalkaranji): Ichalkaranji is situated in western India of Kolhapur district of Maharashtra state. Ichalkaranji is 425 km from Mumbai and nearest airport is Kolhapur airport situated at Ujalaiwadi, 9km South-East from main city. The Hatkanangale railway station (HTK) 7km away from Ichalkaranji city. This city is known for its rapidly growing industrialization governed by the municipal council is popular for the export of textile goods and textile manufacturing industry. The Ichalkaranji city is known as “Manchester of Maharashtra” for its highest per capital income within the country. (www.wikipedia.com)

2.1.2 Site II (Takawade): Takawade village is located in India and listed under the Shiroltaluka from Kolhapur district, Maharashtra state, away from 33km from Shirol. The foremost occupation of villagers is farming. Takawade village is situated on bank of Panchaganga River. Voluminous families run their family on power looms and Ichalkaranji city is very close to Takawade.

2.2. Geography and Climate Conditions

Ichalkaranji is located at 16.7⁰ NTU.47⁰E. The site I and II adores a tropical monsoon climate, the hot scorching summer from March onwards yields to the rainy monsoon in early June. The seasonal rains from the Western sea-clouds are very heavy and the rainfall is over 400cm.

2.3 Selection Of Subjects

The Present investigation was carried out during the year 2024-2025 in Site I and Site II from Kolhapur district of Maharashtra. The purpose of the study was to survey two sites and check the female health status.

The study of human participants was carried out according to ICMR guidelines 2006. All adult subjects (≥ 18 years) given informed consent to participate in the study and consequently they were included in the study. Pregnant or nursing women and subject, declined to give informed consent was excluded from the study. Subjects enrolled after explaining the nature of the study and after obtaining written informed consent from each participant.

In the present study, attempts have been made for physiological evaluation of females of site I and site II. For the present investigation 60 housewives (females) were selected from site I and II. After explaining the nature and importance of study to subject's demographic data,

information regarding quality of life was collected by using pre-designed standard questionnaire. The medical history data of the workers was gathered and taken as baseline data which is based on ATS-DLD-78 adult questionnaire (www.thoracic.org). In 1907s a questionnaire was developed which focused on the subject's self-reported asthma in Tucson and Ariz (Toren *et.al.*, 1993).

2.4 Methodology

Methods for physiological monitoring of workers.

2.4.1 Anthropological Measurements: Anthropological measurements are sequences of quantitative measurements of the muscle, bone and adipose tissue. The fundamental components of anthropometry are height, weight, body mass index (BMI).

2.4.1.1 Height (cm): Each subject ask for took off shoes/sandals and stood at attention on the floor, with hands in natural fall, heels together, toes at 45 degree, heels, hips and shoulders closely against. Height of subject was measured by the non-stretch tap in standing position, with an error less than 0.5cm.

2.4.1.2 Weight (kg): Weight of subject was measured at without shoes by using weight balance on a hard floor surface. Each subject ask to stood on platform, hands should not touch anything. Weight was recorded with an error less than 0.1kg.

2.4.1.3 BMI: Body Mass Index(BMI)was derived by Quetelet's index by calculating a person's height and weight. The statistical measure of the weight of a scaled according to height the following formula is used-

BMI - weight (kg)/ height (m²)

2.5 Physiological Responses

2.5.1Peak Expiratory Flow Rate (PEFR): The Peak Expiratory flow rate is a person's maximum speed of expiration, as measured with a peak flow meter, a small, hand-held device used to monitor a person's ability to breathe out air. Peak flow is the maximal expiratory flow sustained by a subject for at least 10 ml seconds expressed in liters per minutes (Leiner *et.al.*,1963).

Step for using peak flow meter by following steps

Step 1: Before each use, make sure the sliding marker or arrow on the Peak Flow Meter is at the bottom of the numbered scale (zero or the lowest number on the scale).

Step 2: Stand up straight. Remove gum or any food from your mouth. Take a deep breath (as deep as you can). Put the mouthpiece of the peak flow meter into your mouth. Close your lips tightly around the mouthpiece. Be sure to keep your tongue away from the mouthpiece. In one breath, blow out as hard and as quickly as possible (like you are blowing out candles on a birthday cake). Blow a "fast hard blast" rather than "slowly blowing" until you have emptied out nearly all of the air from your lungs.

Step 3: The force of the air coming out of your lungs causes the marker to move along the numbered scale. Note the number on a piece of paper.

Step 4: Repeat the entire routine three times. (You know you have done the routine correctly when the numbers from all three tries are very close together.)

Step 5: Record the highest of the three ratings. Do not calculate an average. This is very important. You can't breathe out too much when using your peak flow meter but you can breathe out too little. Record your highest reading.

Step 6: Measure your peak flow rate close to the same time each day. You and your healthcare provider can determine the best times. One suggestion is to measure your peak flow rate twice daily between 7 and 9 a.m. and between 6 and 8 p.m. You may want to measure your peak flow rate before or after using your medicine. Some people measure peak flow both before and after taking medication. Try to do it the same way each time.

Step 7: Keep a chart of your peak flow rates. Discuss the readings with your healthcare provider.

Results and Discussion

India is one of the few countries in the world where women and men have nearly the same life expectancy at birth. In India there are systematic problems in women's and their health. Indian women's have high mortality rates particularly during childhood and in their reproductive years. Indian women have low level of education and participation in formal labor. Indian women typically have little sovereignty, living under the control of first on their fathers, then their husbands, and finally their sons. All of these factors have a negative impact on their health status.

The present investigation carried out in Ichalkaranji (site-I) and in Takawade (site-II). The data regarding quality of life, demographic data, and health status of females (hose wife's) were recorded. The age group of females varies from 20 to 60 years.

Table no. 1 showed demographic table provides context for health-related findings in the study. The education, caste, age, diet, and habitat distributions help interpret potential BMI and respiratory illness variations between Group I and Group II.

The demographic profile of two groups (Group I and Group II), each consisting of 60 participants (N=60), likely representing housewives in a study examining Body Mass Index (BMI) and Respiratory Illness. Education Qualification in group I and II revealed that, Group I has 3.3% illiterate participants, whereas Group II has 8.3%, suggesting a higher illiteracy rate in Group II. Most participants in both groups have education up to 10th standard (58% in Group I and 71% in Group II). The percentage decreases as education level rises (fewer UG and PG participants). Participants belong to different caste categories are Open (General Category): 48% in Group I, 51% in Group II. OBC (Other Backward Classes): 45% in Group I, 48% in Group II. SC (Scheduled Caste): Group I (5%), none in Group II. NT (Nomadic Tribe): Group I (1.6%), none in Group II. In

Group I Vegetarian are 40% and 36% in Group II where as Mixed diet (both): 60% in Group I and 63% in Group II. Majority of participants consume a mixed diet. Both groups have similar distribution in terms of habitat. Higher illiteracy in Group II might indicate lower health awareness, affecting BMI and respiratory health. The study might explore whether caste-based disparities affect health outcomes. Older participants in Group I might have a higher risk of chronic diseases like obesity or respiratory issues. The impact of vegetarian vs. mixed diet on BMI and respiratory illness might be analyzed.

Table No. 1 Demographic profile of Group-I and Group-II

Demographic variable	Group-I (N=60)			Group-II (N=60)		
	Category	Freq.	%	Category	Freq.	%
Education	Illiterate	2	3.3	Illiterate	5	8.3
Qualification	10 th	35	58	10 th	43	71
	12 th	10	16	12 th	6	10
	UG	8	13	UG	4	6
	PG	5	8.3	PG	2	3.3
Cast	Open	29	48	Open	31	51
	OBC	27	45	OBC	29	48
	SC	3	5	SC	-	-
	NT	1	1.6	NT	-	-
Age	20-30	16	33	20-30	18	29
	30-40	16	50	30-40	23	38

	40-50	23	60	40-50	12	20
	50-60	5	80	50-60	7	11.6
Dilatory Habitat	veg	24	40	veg	22	36
	Both	36	60	Both	38	63

Table No. 2 revealed that BMI (Body Mass Index) categories based on age groups for two groups (Group I and Group II, each with N=60). It helps analyze the distribution of underweight, normal weight, overweight, and obese individuals in different age groups.

Underweight Category is more prevalent in younger participants (20-30 years). Group I: 28.33% are underweight, with a mean BMI of 17.15 ± 1.88 where Group II Higher percentage (41.67%) with a mean BMI of 16.59 ± 2.19 , indicating more severe undernutrition in this group. Normal BMI Category is more common in 30-40 years age group. In Group I 50% of participants fall in the normal BMI range (mean BMI: 22.74 ± 0.79) and in Group II Slightly lower percentage (30%), with a mean BMI of 22.55 ± 1.37 . Overweight Category is more prevalent in 40-50 years age group. In Group I 8.33% with a mean BMI of 29.69 ± 3.36 and Group II: Higher prevalence (20%), with a lower mean BMI of 27.5 ± 1.20 . Group II has a higher number of overweight individuals. Obese Category found mostly in 50-60 years age group. Both groups have 8.33% obesity, but Group II has a slightly higher mean BMI (34.56 ± 4.39) than Group I (32.84 ± 1.46). Obesity risk increases with age in both groups. Young women (20-30 years) in Group II are more underweight (41.67%), indicating possible malnutrition. Middle-aged women (30-40 years) have the highest normal BMI, but fewer in Group II than Group I. Overweight and obesity increase with age, especially in Group II. The study might suggest that lifestyle, socioeconomic status, or health awareness affects BMI trends in these groups.

Table No. 2 BMI Category according to age group in Group-I and Group-II

Sr. No	Age Group	BMI Category	Group I (N=60)			Group II (N=60)		
			Freq	Mean	%	Freq	Mean	%
1	20-30	Underweight	20	17.15 ± 1.88	28.33	25	16.59 ± 2.19	41.67
2	30-40	Normal	30	22.74 ± 0.79	50	18	22.55 ± 1.37	30
3	40-50	Overweight	5	29.69 ± 3.36	8.33	12	27.5 ± 1.20	20
4	50-60	Obese	5	32.84 ± 1.46	8.33	5	34.56 ± 4.39	8.33

±standard deviation

Table No. 3 Correlation between BMI Category and PEFR in Group-I and Group-II

Sr. No	BMI Category	Group I (N=60)			Group II (N=60)		
		Freq.	Mean	%	Freq.	Mean	%
1	Underweight	20	307.5±37.6	26	18	323.38±39.42	30
2	Normal	30	306.25±37.4	26	23	327.82±39.55	38.33
3	Overweight	5	306.95±36.6	38	12	324.58±40.35	20
4	Obese	5	284±36.0	8.3	7	324.28±40.96	11.67

±standard deviation

Table No. 3 showed that, the correlation between BMI (Body Mass Index) categories and PEFR (Peak Expiratory Flow Rate) values in Group I and Group II. PEFR measures lung function and is influenced by body weight, age, and respiratory health. Despite being underweight, Group II has a higher mean PEFR, possibly due to better lung function or fewer respiratory issues. Individuals with normal BMI show better lung function in Group II than Group I, indicating BMI within the normal range supports good respiratory health. Overweight individuals still maintain relatively high PEFR. Obesity is linked to lower lung function in Group I, whereas Group II shows a higher PEFR despite obesity. This suggests possible lifestyle or environmental differences between the groups. Higher BMI, especially obesity, is associated with lower PEFR in Group I, indicating potential respiratory health risks. Group II consistently shows higher PEFR across BMI categories, suggesting better lung function overall. Underweight individuals in Group I have a lower PEFR than those in Group II, highlighting differences in nutritional status and respiratory health. Normal-weight individuals have the best PEFR values, reinforcing the importance of maintaining a healthy BMI for optimal lung function. This table helps correlate BMI with respiratory efficiency and supports the study's findings on the impact of body weight on respiratory health in Indian women. The occupation of most villages, especially in small villages, is mainly agriculture, which is non-mechanized in some cases. People in rural areas therefore do more physical work than they do in urban area. The difference body pain is therefore justifiable given this rural lifestyle. Social functioning was found to be higher in the studied urban women as compared to rural women. Women living in towns have generally more opportunities to engage in sociocultural and economic compared to rural women.

A cross sectional descriptive epidemiological study of BMI category in group I and in group II shows the overweight category and obese category and its risk factors among village

and city Housewife. Area with the aim to determine the prevalence of overweight and obese and BMI category and respiratory certain risk factors associated with them.

In the present study, the prevalence of overweight and obese category was 60% and 80% respectively.

Group II the prevalence the overweight and obese are decreased in group II and as well as in underweight and normal BMI category in group I and group II having not much more difference. In the present study it was found that lower body pain in urban women a comprehensive study in site II found higher prevalence of pain in site I woman compared to those in urban women. (IJWHRS 2017).

In group I as compared to in group II the prevalence of overweight and obese was 20% and 11.66% respectively.

In our study we intended to correlation between BMI & PEFr in group I and group II show in the table no 3. Consequently as per observation the result obtained in group I the PEFr value was significantly decreased above to below. Similarly, in group II the PEFr value was significantly increase above to below as compare with BMI category.

As the BMI considers only height and weight, its value on distribution between adipose tissue and lean mass are not always accurate. Study by Banerjee *J et al.* 2014 also demonstrate compared to BMI, body fat percentage as a better index for determination of lung function impairments in obese category subjects. It also indicated upper body obesity has a ore server impact on the lung volumes are compared to obese patients with lower body obesity. The pulmonary functions are not under the influence of body weight but muscularity and fat distribution plays a significant role. The negative correlation was observe by Bilgin *et al* 2010 between percentage and FV, MVV & PEFr

The PEFr has been well correlated to maximum expiratory pressure which is a representation of respiratory muscle strength. It has been believed that as per group the city female gas lower PEFr value as compare to village female.

PEFr is fairly good indicator of bronchial hyper responsiveness and does not requires body temp. Pressure saturated correction. The PEFr values are affected by various factors, such as a sex, body surface area, obesity, physical activity, and environment. The primary factors that affected PEFr are strength of the respiratory muscles, respiratory compliance and the airway size.

In our study we intended the pulse rate according to age group I and group II showing in table no. IV as per result obtained in group I as well as in group II shows the significantly normal range a per age group. So in city female and village female pulse rate value was in normal range as per their age. Such physical differences may be attributed to their life style and occupational needs which require extra energy expenditure for their daily activities, resulting in some adaptive change.

Conclusions

The present study concluded that the almost all the female suffer from blood pressure. The predominantly cardio respiratory fitness depends on the physical fitness index and the respiratory problem are more significantly observed in the entire group. Respiratory rate was reduced in group I and increased in group II. All age group normal BMI category and normal pulse rate but decreased peak expiratory flow rate in group I and increased in group II.

There is a need of strong interrelationships between women health and development underscores the need to address the women reproductive health and its status since women faces various unique health issues as compared to male there is need for more specific and combined research on women health status. The parameter is effort dependent and the forced expiration is not required to be extended to residual volume when it is to be measured using the portable instrument. A set of regression equations for use for the Indian population has been derived. We argue that the measurement of BMI level of obesity can learn much from the measurement of poverty and we have adapted some of the common poverty measures to summaries obesity data. We believe that this approach provides a very useful supplement to the summary measure of obesity which is commonly presented and as an illustration of this we apply these measures to Irish data. The study revealed that there are association between BMI and respiratory illnesses among housewives. Obesity and underweight negatively impact on lung function, with environmental, lifestyle, and socioeconomic factors. This concern requires public health initiatives programe, improved ventilation in households, awareness campaigns on maintaining a healthy BMI, and greater access to healthcare services for housewives.

Recommendation

- Prevention of obesity is much more desirable than the treatment of the condition once it is established.
- Prevention should begin early in life and should be based on development and maintenance of lifelong healthy eating and physical activity pattern.

- More attention should be given to strategies aimed at preventing weight gain and obesity, since these are likely to be more cost effective and have grate positive impact on the long term control of body weight.
- Obesity management programmes should be established within health care and community services to target individuals and subgroups of the populations who have developed or are at risk of developing obesity and its co morbidities
- Training of all health care workers involved in management of obese patients should be improved.
- High prevalence of depression in the studied population emphasize the need to focus on creating awareness regarding depression among the general population and to ensure accessibility and availability of proper healthcare service fir early identification of depression and its management.
- Similar study is carried out on a large sample to obtain more precise result.

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