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Assessment of levels of physical activity and waist to height ratio among adults in a rural area of Kashmir valley: A cross sectional study

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Abstract
Background: Non-communicable diseases and their risk factors have become a major public health challenge worldwide. Some NCD risk factors are well known (smoking, raised blood pressure, obesity) while some like Physical inactivity and Waist to height (WHt) ratio have not been studied extensively.
Objectives: 1.To assess the levels of physical activity among adults in a rural area of Kashmir Valley. ii) To assess the WHt Ratio of adults in a rural area of Kashmir Valley. iii) To study the association of physical activity and WHt ratio with selected socio demo graphic variables of the study population.
Methodology: This cross sectional study was conducted among adults in a rural area of Kashmir Valley. Data was collected on socio demo graphic particulars and physical activity. Waist circumference and height of the participants were measured using standard procedures.
Results: 52.60% of the participants were engaged in moderate physical activity followed by 29.16% in low physical activity and 18.22% in high physical activity. The levels of physical activity were significantly associated with the levels of education. 30.25% of participants had increased waist to height ratio. Increased waist to height ratio was significantly higher in females than males**.**
Conclusion: A considerable proportion of the study population were predisposed to Non Communicable Diseases (NCDs) and their unfavourable outcomes. Sustainable efforts by all stakeholders need to be made and steps taken for early identification and addressing these risks at the earliest.

Keywords: physical activity, waist to height ratio, adults, non-communicable diseases, risk factors

Introduction

Non-communicable diseases (NCDs) and their associated risk factors have emerged rapidly and have become a major public health challenge worldwide, the most globally pervasive change has been its rising burden [1]. The World Health Organization (WHO) report 2002 stated that the mortality, morbidity and disability attributed to the major NCDs accounted for about 60% of global deaths and 47% of burden of disease [2].'Risk' is defined as a probability of an adverse health outcome, whereas 'risk factor' refers to an attribute or characteristic exposure of an individual whose presence or absence raises the probability of an adverse outcome [3]. Often the prevalence of NCDs in a population is directly related to prevalence of its risk factors so preventing these risk factors will prevent these diseases. The impact of NCDs is devastating in terms of premature morbidity, mortality and economic loss [4, 5]. Common preventable risk factors underlie most NCDs such as tobacco-use, unhealthy diet, physical inactivity, and excess adiposity. These risk factors are a leading cause of the death and disability burden in nearly all countries, regardless of economic development. The leading risk factor globally for mortality is raised blood pressure (responsible for 13% of deaths globally), followed by tobacco use (9%), raised blood glucose (6%), physical inactivity (6%), and overweight and obesity (5%) [6]. Some NCD risk factors are well known, and have Been subject to surveillance for a long time (e.g. tobacco use, raised blood pressure, overweight & obesity. Some risk factors like Physical inactivity have not been studied extensively. Also recently a systematic review collated seventy-eight studies exploring waist to height ratio (WHtR) and waist circumference (WC) or BMI as predictors of diabetes and CVD, published in English between 1950 and 2008. Twenty-two prospective analysis showed that WHtR and WC were significant predictors of these cardio metabolic outcomes more often than BMI. Mean boundary values for WHtR, covering all cardio metabolic outcomes, from studies in fourteen different countries and including Caucassian, Asian and Central American subjects, were 50 for men and. 50 for women. WHtR and WC are therefore similar predictors of diabetes and CVD, both being stronger than, and independent of, BMI. To make firmer statistical comparison, a meta-analysis is required. The AUROC analyses indicate that WHtR may be a more useful global clinical screening tool than WC, with a weighted mean boundary value of. 5, supporting the simple public health message "keep your waist circumference to less than half your height" [7].

Since physical inactivity is a risk factor for NCDS and increased WHt ratio could be one of the predictors for NCDs, the present study was thus undertaken to assess the level of physical activity

and WHt ratio among adults in a rural area of Kashmir Valley.

2. Objectives

1. To assess the levels of physical activity among adults in a rural area of Kashmir Valley.
2. To assess the WHT Ratio adults in a rural area of Kashmir Valley.
3. To study the association of physical activity and WHt ratio with selected socio demo graphic variables of the study population

3. Methodology

This population based cross sectional study was conducted over a period of six months among adults aged 25-64 years in a rural area of Kashmir Valley. The Sample size was calculated by using following formula

n=Z2 p (1-p) /e2, where

n=Sample size,

Z2 =Confidence interval,

P = prevalence,

e2 = margin of error

A response rate of 80% was taken. Design factor of 1 was used. Age-sex estimate correction of 2 was done. Thus by the above formulae sample size came out to be 960 individuals. Multistage and multiphasic sampling technique was utilized in this study to assess the level of physical activity among the study population. All the villages along with their population were enlisted. Then the cumulative population of each village was calculated and was divided by 30 to get cluster interval. First cluster was chosen randomly and subsequent clusters based on cluster interval. In each cluster 32 individuals were selected by Kish method. In this method each household in the cluster received a number. The *Kish Household List* determined Kish table which was used for each household based on the number of the households. The household information was filled on the coversheet and a participant was selected based on the Kish table. All participants were studied in a face-to-face interview for obtaining demographic particulars on a pre-structured questionnaire. Physical activity was assessed by using the following working definitions

Physical Activity: Physical activity (PA) was defined as any bodily movement produced by contraction of skeletal muscles that substantially increases energy expenditure. Physical Activity was categorized as

- **High:** Vigorous-intensity activity on at least three days achieving a minimum of at least 1,500 MET-minutes/week OR; and Seven or more days of any combination of walking, moderate or vigorous intensity activities achieving a minimum of at least 3,000 MET-minutes per week.
- **Moderate:** Three or more days of vigorous-intensity activity of at least 20 minutes per day OR; Five or more days of moderate-intensity activity or walking of at least 30 minutes per day.
- **Low:** A person not meeting any of the above mentioned criteria

(High and moderate) falls in this category. Physiological measures of height and waist were taken and WHt ratio was calculated.

A. Height: Height was measured in the Frankfort plane with a portable stadio meter. The measurements were taken to the nearest 0.1 cm.

B. Waist circumference: It was taken by using a non-stretchable measuring tape. Waist circumference was measured at the midpoint between the lower margin of last rib and the iliac crest to the nearest 0.5cm.

Statistical Analysis: The standard statistical test like chi square (x2) was applied where ever required. All the results obtained have been discussed on 5% level of significance i.e. a p value of < 0.05 has been considered significant. The analysis of the data was done using SPSS version 20.00, Chicago, USA for windows.

4. Results

Table 1: Physical Activity in the studied population

Sex	Physical Activity						Total	
	Moderate		Low		High			
	N	(%)	N	(%)	N	(%)		
Male	198	61.14	3	0.92	123	37.96	324	100
Female	307	48.32	277	43.55	52	8.17	636	100
Total	505	52.60	280	29.16	175	18.22	960	100

Table 1 shows the level of physical activity in the study population. Out of the total study participants 52.60% were engaged in moderate physical activity followed by 29.16% in low physical activity and 18.22% in high physical activity. Among males 61.14% were involved in moderate activity, 37.96% in high and only 0.92% in low physical activity while among females 48.32% reported being engaged in moderate activity followed by 43.55% in the low activity and only 8.17% females were engaged in high physical activity.

Table 2: Physical Activity across different age groups

Age Group	Physical Activity						Total (%)	
	Low		Moderate		High			
	n	(%)	n	(%)	n	(%)		
25-34	85	29.20	140	48.10	66	22.68	291	100
35-44	84	28.75	166	56.65	43	14.67	293	100
45-54	64	25.39	148	58.75	40	15.87	252	100
55-64	47	37.60	51	40.80	27	21.60	125	100
Total	280	29.16	505	52.60	175	18.22	960	100

X^2=6.08, p=0.108

Table 2 shows the level of physical activity in the study Population with respect to their age groups. Out of total respondents 37.60% of participants in the age group of 55-64 years reported low physical activity followed by 29.20% in 25-34 years, 28.75% in 35-44 years and 25.39% in 45 -54 years. While 22.68% in the age group of 25-34 were engaged in high

Physical activity followed by 21.60% in 55-64 years, 15.87% in 45-54 years and14.67% in 35-44 years. The association was statistically non-significant ($_{p=0.108}$).

Table 3: Physical Activity in different Education Levels

Education	Physical Activity						Total	
	Low		Moderate		High			
	n	(%)	n	(%)	n	(%)	n	(%)
Illiterate	180	36.36	239	48.28	76	15.35	495	100
Primary	11	11.82	66	70.96	16	17.20	93	100
Middle	23	33.82	31	45.58	14	20.58	68	100
Secondary	24	20.01	80	65.57	18	14.75	122	100
Higher secondary	20	20.46	52	53.06	26	26.53	98	100
Graduate	13	28.26	25	54.82	8	17.39	46	100
Post-Graduate & above	9	23.68	12	31.68	17	44.73	38	100
Total	280	29.16	505	52.60	175	18.22	960	100

X^2=36.19, p<0.001

Table 3 depicts the level of physical activity in the study population with respect to their educational status. Out of total study participants 44.73% of subjects with higher qualification were engaged in high activity, 26.53% with higher secondary qualification followed by middle (20.58%). While as (36.36%) illiterates and (33.82%) middle pass were engaged in low physical activity. Thus it is evident that the participants with lower levels of education were physically less active while as the participants with higher levels of education were physically more active and the association between physical activity and level of education was statistically highly significant(p value<0.001).

Table 4: Physical Activity with Socio Economic Status

Socio Economic Class	Physical Activity						Total	
	Low		Moderate		High			
	n	(%)	n	(%)	n	(%)	n	(%)
Class I	44	28.75	74	48.36	35	22.87	153	100
Class II	70	28.22	122	49.19	56	22.58	248	100
Class III	84	29.16	167	57.98	37	12.84	288	100
Class IV	78	29.88	138	52.87	45	17.24	261	100
Class V	4	40	4	40	2	60	10	100
Total	280	29.16	505	52.60	175	18.22	960	100

X^2=0.75, p=0.94

Table 4 shows the level of physical activity in the study population with respect to their socioeconomic status. Out of total study participants 40% and 29.88% of the respondents belonging to Class- V & IV respectively reported low physical activity while a high physical activity was found in class -V (60%) followed by class I 22.87% and so on. The association was statistically non-significant.

Table 5: Waist to Height Ratio in the studied population.

Sex	Waist to Height Ratio >0.5%		Waist to Height Ratio <0.5%		Total	
	N	Percent	N	Percent	N	Percent
Male	44	13.58	280	86.42	324	100
Female	246	38.67	390	61.32	636	100
Total	290	30.25	670	69.75	960	100

X^2=64.14, p<0.001

Table 5 shows distribution of waist to height ratio in the study population Overall 30.25% of participants had increased waist to height ratio. Among females 38.67% had waist to height ratio > 0.5% whereas only 13.58% among males had waist to height ratio > 0.5%. The difference was statistically significant.

Table 6: Waist to Height Ratio across different age group

Age group	Waist to Height Ratio >0.5%		Waist to Height Ratio <0.5%		Total	
25-34	58	19.93	233	80.06	291	100
35-44	69	23.54	224	76.45	293	100
45-54	90	35.71	162	64.28	252	100
55-64	73	58.87	51	41.12	124	100
Total	290	30.25	670	69.75	960	100

X^2=72.68, p<0.001

Table 6 shows distribution of waist to height ratio in the study population with respect to their age. Out of total respondents 58.87% of participants in the age group of 35-44years had increased waist to height ratio with lowest percentage in less than 25-34 years old (19.93%). As is evident the percentage of participants with greater waist to height ratio increased with increase in age. The association was found to be statistically highly significant.

Table 7: Waist to Height Ratio with Education

Education	Waist to Height Ratio >0.5%		Waist to Height Ratio <0.5%		Total	
Illiterate	183	36.96	312	63.03	495	100
Primary	23	24.73	70	75.26	93	100
Middle	20	29.41	48	70.58	68	100
Secondary	26	21.31	96	78.68	122	100
Higher Secondary	17	17.34	81	82.65	98	100
Graduate	5	10.86	41	89.13	46	100
Post Graduate	16	42.10	22	57.89	38	100
Total	290	30.25	670	69.75	960	100

X^2=35.86, p<0.001

Table 7 shows distribution of waist to height ratio in the study population with respect to their educational status. Overall 50% of postgraduates had a waist to height ratio of >0.5%, followed by 36.98% of illiterates, only 11.48% of graduates had the same. The difference was statistically significant.

Table 8: Waist to Height Ratio with Marital Status

Marital Status	Waist to Height Ratio >0.5%		Waist to Height Ratio <0.5%		Total	
Married	227	37.52	378	62.47	605	100
Ever married	16	28.07	41	71.92	57	100
Un-married	39	13.08	259	86.91	298	100
Total	290	30.25	670	69.75	960	100

X^2=57.50, p<0.001

Table 8 shows distribution of waist to height ratio in the study population with respect to their marital status. Percentage of Waist to height ratio >0.5% was highest in married (37.52%) followed by ever married (28.07%) and by un-married (13.08%).The difference was statistically significant.

5. Discussion

Physical inactivity leads to higher morbidity from cardiovascular disease, ischemic stroke, metabolic syndrome, cancer, non-insulin dependent diabetes mellitus, osteoporosis, and mental health [8]. The prevalence of low physical activity in our study was 29.16%. A similar study conducted by Li Y E *et al* (2013) in China showed the prevalence of physical inactivity of 18.3% [9]. However the study conducted by Okpechi *et al* (2013) in Nigeria reported 64.2% [10] prevalence of physical inactivity. In another study done in Madhya Pradesh the prevalence of physical inactivity was found to be 42% [11]. The high prevalence of physical inactivity may be because of easy availability of public, as well as personal transportation and improved socioeconomic status. In a systematic review and meta-analysis done by Ashwell M *et al* (2012) of 31 studies, they concluded that Waist to height ratio should be considered as a better screening tool for cardio metabolic risk than BMI and waist circumference alone [12, 13]. Browning *et al* (2010) did a systematic review of 78 studies exploring waist to height ratio (WHtR) and waist circumference or BMI as predictors of diabetes and CVD. They too reported waist to height ratio as a more useful global screening tool and. 5 to be considered as suitable global boundary value [7]. 30.25% of the study population in the current study had a Waist to Height ratio of >0.5%). So, it is clear that, our population is not far away from adverse cardio metabolic outcomes.

6. Conclusion and Recommendations

A considerable proportion of the study population was physically inactive and also had a waist to height ratio of >0.5% thus predisposing them to NCDs as well as to their unfavourable outcomes. In order to prevent these, educating the masses about the importance of physical activity and the risks associated with increased waist to height ratio is a must. Also sustainable efforts by all stakeholders need to be made and steps taken for early identification and addressing these risks at the earliest so that the burden of NCDs is reduced.

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