Hip and waist circumference correlations with demographic factors and pain intensity in patients with chronic pain

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INTRODUCTION

- Chronic pain is a major global health problem, affecting over 1.7 billion people worldwide, and having a significant impact on a patient's mental health, sleep habits, and physical state.
- Obesity and overweight status are associated with severe and debilitating chronic pain conditions. However, there is mixed evidence regarding the relationship between chronic pain and anthropometric measurements, such as BMI.
- Waist circumference (WC) and hip circumference (HC) are better indicators of obesity than BMI. Data has shown a strong positive association between larger WC and HC and the increased risk of chronic illnesses, including chronic pain.

HYPOTHESIS

We hypothesize that there will be a positive correlation between hip and waist circumference and the severity of chronic pain experienced in adults.

METHODS

- Data was collected from the NIH's All of Us database which provides patient data representative of the US population
  - Data includes electronic health records, standardized measurements, and patient reported outcomes
- We retrospectively examined all participants 18 years and older who had measurements of HC and WC
  - Waist hip ratio (WHR) was calculated
  - Patients were divided into cohorts based on their status of chronic pain and pain severity
- Mean, SD, and ranges were compiled for each cohort
- ANCOVA analysis was used to determine the differences between cohorts and to determine if demographical variables were influencing the data including sex, age and ethnicity/race

RESULTS

Table 1: Total number of patients and percentiles in each cohort based on race and sex MT1P- more than one population

Group	Group Type	Total Number of Participants							
	Race	White		Black		Asian		MT1P	
	Sex	Female	Male	Female	Male	Female	Male	Female	Male
A	Total Cohort	204013							
		134833		52308		8302		4287	
		66.09%		25.63%		4.06%		2.1%	
		81414	53419	30087	22221	4996	3306	2802	1485
		60.38%	39.62%	57.52%	42.48%	60.18%	39.82%	65.36%	34.64%
B	Patients w/o chronic pain	152559							
		98082		40660		7281		3388	
		64.29%		26.65%		4.77%		2.22%	
		57556	40526	22171	18489	4334	2947	2135	1253
		58.68%	41.32%	54.53%	45.47%	59.52%	40.47%	63.01%	36.98%
C	Patients w/ mild/moderate chronic pain	38348							
		29593		6492		866		627	
		77.17%		16.93%		2.25%		1.63%	
		18987	10606	4391	2101	548	318	459	168
		64.16%	35.84%	67.64%	32.36%	63.28%	36.72%	73.2%	26.79%
D	Patients with severe chronic pain	13106							
		7158		5156		155		272	
		54.61%		39.34%		1.18%		2.07%	
		4871	2287	3525	1631	114	41	208	64
		68.05%	31.95%	68.36%	31.63%	73.55%	26.45%	76.47%	23.53%

Table 2: Mean and standard deviation of WC, HC and WHR ratio in each group for complete range of WC and HC measurements

Group	Sex	WC (Mean ± Std)	HC (Mean ± Std)	WHR (Mean ± Std)
A	Female	93.18 ± 17.39	109.47 ± 15.2	0.86 ± 0.2
	Male	99.84 ± 15.70	105.93 ± 11.28	0.95 ± 0.18
B	Female	91.84 ± 17.20#***	108.49 ± 14.95#***	0.86 ± 0.2#***
	Male	98.83 ± 15.52#***	105.44 ± 11.11#***	0.94 ± 0.18#***
C	Female	96.67 ± 17.39$***, ^***	112.01 ± 15.55$***, ^***	0.88 ± 0.2$***, ^***
	Male	103.54 ± 15.81$***, ^***	107.75 ± 11.72$***, ^***	0.97 ± 0.18$***, ^***
D	Female	101.68 ± 17.49@***, &***, +***	115.26 ± 16.41@***, &***, +***	0.9 ± 0.2@***, &***, +***
	Male	104.59 ± 17.45@***, &***, +**	108.19 ± 13.19@***, &***	0.98 ± 0.2@***, &***, +*

Comparisons are between groups accounting for sex using ANOVA with Tukey's correction; **#**: A vs B; **$**: A vs C; **@**: A vs D; **^**: B vs C; **&**: B vs D; **+**: C vs D; *: p <0.05; **: p<0.01; ***: p<0.001

- For both males and females, the average HC, WC and WHR increased as pain severity increased
- ANCOVA analysis revealed Sex was acting as a co-variate.
  - Sex affected WC and sex and race both affected WHR
  - Females had significantly larger HC compared to males and males had a greater WC and WHR
  - Males and Females were analyzed separately due to this.
- Age only affected HC with younger people having higher HC.
- Ethnicity affected two measures (WC and HC) with larger values in the Hispanic population compared to non-Hispanics
  - White, Black, and multiracial women in both the mild/moderate pain group and the severe pain group had larger HC, WC and WHR measurements

CONCLUSION

- These data suggest that when assessing hip and waist circumference to aid in predicting chronic pain status demographic variables including sex, age, race and ethnicity need to be considered.
- We add to the literature by describing waist circumference (WC) and hip circumference (HC) in chronic pain patients in the United States.
- When offering treatment to patients with chronic pain, it is important to holistically manage patients.

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