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# A survey study on association between Central Obesity and *Ratri Jagarana* (Night Duty)

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## ABSTRACT

**Introduction:** *Ratri Jagarana* is *Rookshana*, which causes increase in Vata. In this present time of industrialization and globalization our lifestyle has become too hectic, many of the people do their jobs at night viz., drivers, receptionist, hospital workers, security guard, call center employees, factory workers, students and many more. It is highly impossible to completely stop their night work, due to *Ratri Jagarana*, *Dathu Poshana* will not happen properly leads to some changes in their body composition. Central obesity is the major health challenge we are facing presently and caused due to unhealthy life style which includes unhealthy sleep habits. Central obesity is mainly assessed by waist circumference and waist height ratio. So, the present study is done to study the association between central obesity and night duty workers. **Materials and methods:** 400 volunteers those who are having night duty shifts for at least 10 days in a month, from a period of not less than one year with working time of at least eight hours, eight pm to eight am were selected. Study group- 200 volunteers doing night duties fulfilling the inclusion criteria. Control group- 200 volunteers who are not doing night duties. By questionnaire method based, on duration of *Ratri Jagarana* (night shift), food habit, duration of day sleep, physical activity was assessed. Waist circumference was measured for all the volunteers. The collected data will be recorded and analyzed. **Results:** There was statistically significant association between central obesity and *Ratri Jagarana* among night duty workers.

**Key words:** *Ratri Jagarana*, Ayurveda, central obesity.

## INTRODUCTION

*Ahara*, *Nidra* and *Brahmacharya* are given prime importance under the name of "*Trayopastambha*" the pillars of life.<sup>[1]</sup> The strength complexion and compactness of the individual body depends on these three factors.

*Nidra*, when taken properly in terms of quality and

quantity bestows *Sukha* (Pleasure), *Pushti* (Nourishment and growth), *Bala* (Strength and immunity), *Vrishataa* (Potency and sexual vigour), *Gnaanam* (Knowledge and intellect) & *Jeevitam* (Good life span, longevity of life).<sup>[2]</sup> On the other hand an abnormal sleep in terms of quality and quantity (inadequate, excessive or irregular) bestows harmful effects or opposite qualities of those said above that is *Dukkha* (grief), *Karshya* (emaciation), *Abala* (loss of strength and immunity), *Kleebhatha* (impotent and sterility), *Ajnanam* (ignorance and idiocy) and *Ajeevitham* (death).

*Ratri Jagarana* is *Rookshana*, which causes increase in *Vata*.<sup>[3]</sup> In this present time of industrialization and globalization our lifestyle has become too hectic, many of the people do their jobs at night viz., drivers, receptionist, hospital workers, security guard, call center employees, factory workers, students and many more. It is highly impossible to completely stop their night work, due to *Ratri Jagarana* *Dathu Poshana* will

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not happen properly leads to some changes in their body's anthropometry.

Central obesity is the major health challenge we are facing presently and caused due to unhealthy life styles which include unhealthy sleep habits. Central obesity is mainly assessed by waist circumference and waist height ratio. So the present study is done to study the association between central obesity and night duty workers.<sup>[4]</sup>

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## MATERIALS AND METHODS

### Source of Data

Clinically healthy individuals those who are doing night duty were considered under study group and those who are not doing night duty are considered under control group in and around Hassan district.

### Method of Collection of Data

Clinically healthy individuals who fulfilled inclusion criteria were selected in and around Hassan district.

### Inclusion Criteria

- Age : 18-60 years
- Gender : All
- Night duty workers having night shift at least eight hours
- A period of not less than one year of night duty.
- Participants ready to give informed written consent

### Exclusion Criteria

- Any chronic Systemic and Psychological illness.
- Sleep Related Disorders.
- Those who are under long term medication for DM/ HTN

### Study Design

The present study was an open label, double arm survey study on 400 subjects using the convenient

(non-random) sampling technique with pre-test and post-test design.

Total Sample Size - 400

Duration of the study - 18 months

It is a two-group survey clinical study of 400 patients. 200 patients in study group and 200 in control group and 200 in control group

### Plan of the Study

#### Assessment Criteria

Waist circumference

Waist height ratio

#### Waist circumference<sup>[5]</sup>

- Patient's lower rib is palpated.
- Naval is located.
- Waist circumference is measured at the vertical level below the lower rib in the narrowest part of the abdomen.
- Measuring tape is placed horizontally encircling around the patient's waist.
- The tape is tightened around the patient's abdomen without depressing the skin.
- At the end of a normal expiration the number (the nearest centimeter) is noted from the zero line of the tape

#### Height<sup>[6]</sup>

The height is measured using stadiometer.

- The person to be measured was located right below the height meter, barefoot, with relaxed shoulders, the scapula, buttocks and heels should be touching the wall, arms on each side of the body, legs straight and together.
- The person was asked to look straight.
- The tape of the stadiometer is pulled against and place over the head.
- The measurement appeared in the reading window.

- The numbers were noted.

The parameters of central obesity that is- waist circumference, waist height ratio was assessed with the symptoms caused due to *Nidranasha*.<sup>[7]</sup> (annexure 1)

**Statistical Method**

Data is collected using case report form (CRF) designed by incorporating the inclusion criteria. Data is tabulated and analyzed using SPSS (Statistical Package for Social Sciences) version 20. Pearson is the correction factor used. Cross tabulation, Correlation, and Chi square tests were used for the analysis of data and to correlate the impact of *Ratrijagarana* on Central Obesity.

**Method of Analysing Avara Shareera Samhanana**

**Waist Height Ratio**

Avara Yes: ≥ 0.50

Avara No: < 0.50

**Waist Circumference**

Avara Yes: ≥ 94 cm for men ≥ 80 cm for women

Avara No: < 94 cm for men < 80 cm for women

**RESULTS**

**Association of Waist Height Ratio between the Group**

**Table 1: Cross tabulation on waist height ratio**

Group of Subjects * Waist Height Ratio Cross Tabulation			Waist Height Ratio		Total
			Yes Avara	No Avara	
Group of Subjects	Case	Count	136	64	200
		Expected Count	124	76	200
	Control	Count	112	88	200
		Expected Count	124	76	20
Total		Count	248	152	400

Expected Count	248	152	400
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In control group (n=200) 112 subjects had *Avara* waist height ratio and 88 not had *Avara* waist height ratio. In case group (n=200), 136 subjects had *Avara* waist height ratio and 64 not had *Avara* waist height ratio.

**Table 2: Chi-square value for waist height ratio.**

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.112 <sup>a</sup>	1	0.013		
Continuity Correction	5.613	1	0.018		
Likelihood Ratio	6.132	1	0.013		
Fisher's Exact Test	-	-	-	0.018	0.009
Linear-by-Linear Association	6.097	1	.014		
N of Valid Cases	400				

**Table 3: Risk estimation for waist height ratio**

Risk Estimate	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Group Of Subjects (Case / Control)	.599	.398	.900
For Cohort Waist Height Ratio = Yes Avara	.824	.705	.962
For Cohort Waist Height Ratio = No Avara	1.375	1.065	1.775
N of Valid Cases	400		

The value of fisher’s exact test is 0.018 which is statistically significant. The chi-square statistic (0.009) is similarly statistically significant. Therefore, it can be stated that subjects in case group, i.e., night duty workers are having *Avara* waist height ratio.

**Association of Waist Circumference between the Group**

**Table 4: Cross tabulation for waist scale and *Shareera Samhanana***

Group of Subjects * Waist Scale Cross tabulation			Waist Scale			Total
			Yes, <i>Avara</i> Waist	No <i>Avara</i> Waist	22.00	
Group of Subjects	Case	Count	68	128	4	200
		Expected Count	50.0	147.5	2.5	200.0
	Control	Count	32	167	1	200
		Expected Count	50.0	147.5	2.5	200.0
Total		Count	100	295	5	400
		Expected Count	100.0	295.0	5.0	400.0

In control group (n=200) 32 subjects had *Avara* waist scale and 167 not had *Avara* waist scale. In case group (n=200), 68 subjects had *Avara* waist height ratio and 128 not had *Avara* waist scale.

**Table 5: Chi square for waist scale between the group**

Chi-Square Tests	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	19.916 <sup>a</sup>	2	0.000
Likelihood Ratio	20.354	2	0.000
Linear-by-Linear Association	0.274	1	0.601

N of Valid Cases	400		
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Symmetric Measures		Value	Asymptotic Standardized Error <sup>a</sup>	Approximate T <sup>b</sup>	Approximate Significance
Interval by Interval	Pearson's R	-.026	.047	-.523	.602 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	.189	.049	3.836	.000 <sup>c</sup>
N of Valid Cases		400			

**Association between Waist Height Ratio and Symptoms**

**Tiredness**

**Table 6: Cross tabulation for WhtR and tiredness**

Crosstab			Tiredness		Total
			Yes	No	
Waist Height Ratio	Yes <i>Avara</i>	Count	58	54	112
		Expected Count	54.9	57.1	112.0
	No <i>Avara</i>	Count	40	48	88
		Expected Count	43.1	44.9	88.0
Total		Count	98	102	200
		Expected Count	98.0	102.0	200.0

Among the subjects with *Avara* waist height ratio, 58 had tiredness and 54 had no tiredness and among the subjects with no *Avara* waist height ratio, 40 had tiredness and 48 had no tiredness.

**Table 7: Chi square test for waist height ratio and tiredness**

Chi-Square Tests	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	0.790 <sup>a</sup>	1	0.374		
Continuity Correction	0.557	1	0.455		
Likelihood Ratio	0.791	1	0.374		
Fisher's Exact Test				0.395	0.228
Linear-by-Linear Association	0.786	1	0.375		
N of Valid Cases	200				

Symmetric Measures		Value	Asymptotic Standardized Error	Approximate T	Approximate Significance
Interval by Interval	Pearson's R	0.063	0.071	0.886	0.376 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	0.063	0.071	0.886	0.376 <sup>c</sup>
N of Valid Cases		200			

**Table 8: Risk estimation between the waist height ratio and tiredness.**

Risk Estimate	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Waist Hheight Ratio (Yes Avara / No Avara)	1.289	0.736	2.256

For cohort Tiredness = Yes	1.139	0.852	1.523
For cohort Tiredness = No	0.884	0.674	1.159
N of Valid Cases	200		

The value of fisher's exact test is 0.395 which is statistically not significant. The chi-square statistic (0.228) is similarly statistically not significant. Therefore, it can be stated that subjects in case group, i.e., night duty workers are not having tiredness.

**Indigestion**

**Table 9: Cross tabulation between waist height ratio and indigestion.**

Crosstab			Indigestion		Total
			Yes	No	
Waist Height Ratio	Yes Avara	Count	16	96	112
		Expected Count	14.0	98.0	112.0
	No Avara	Count	9	79	88
		Expected Count	11.0	77.0	88.0
Total		Count	25	175	200
		Expected Count	25.0	175.0	200.0

Among the subjects with *Avara* waist height ratio, 16 had indigestion and 96 had no indigestion and among the subjects with no *Avara* waist height ratio, 9 had indigestion and 48 had no indigestion.

**Table 10: Chi-square for waist height ratio and indigestion**

Chi-Square Tests	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	0.742 <sup>a</sup>	1	0.389		



Continuity Correction <sup>b</sup>	0.417	1	0.518		
Likelihood Ratio	0.754	1	0.385		
Fisher's Exact Test				0.519	0.261
Linear-by-Linear Association	0.738	1	0.390		
N of Valid Cases	200				

Symmetric Measures		Value	Asymptotic Standardized Error	Approximate T <sup>b</sup>	Approximate Significance
Interval by Interval	Pearson's R	0.061	0.069	0.859	0.392 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	0.061	0.069	0.859	0.392 <sup>c</sup>
N of Valid Cases		200			

**Table 11: Risk estimation between waist height ratio and indigestion**

Risk Estimate	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Waist Height Ratio (Yes Avara / No Avara)	1.463	0.613	3.489
For Cohort Indigestion = Yes	1.397	0.648	3.009
For cohort Indigestion = No	0.955	0.861	1.059

N of Valid Cases	200		
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The value of fisher's exact test is 0.519 which is statistically significant. The chi-square statistic (0.216) is similarly statistically not significant. Therefore, it can be stated that subjects in case group, i.e., night duty workers are not having indigestion.

**Heaviness in head**

**Table 12: Cross tabulation between waist height ratio and heaviness in head**

Crosstab			Heaviness In Head		Total
			Yes	No	
Waist Height Ratio	Yes Avara	Count	21	91	112
		Expected Count	17.4	94.6	112.0
	No Avara	Count	10	78	88
		Expected Count	13.6	74.4	88.0
Total		Count	31	169	200
		Expected Count	31.0	169.0	200.0

Among the subjects with Avara waist height ratio, 21 had heaviness in head and 91 had no heaviness and among the subjects with no Avara waist height ratio, 10 had heaviness in head and 78 had no heaviness in head.

**Table 13: Chi-square test between waist height ratio and heaviness in head**

Chi-Square Tests	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.053 <sup>a</sup>	1	0.152		
Continuity Correction <sup>b</sup>	1.528	1	0.216		

Likelihood Ratio	2.104	1	0.147		
Fisher's Exact Test				0.172	0.107
Linear-by-Linear Association	2.043	1	0.153		
N of Valid Cases	200				

Symmetric Measures		Value	Asymptotic Standardized Error <sup>a</sup>	Approximate T <sup>b</sup>	Approximate Significance
Interval by Interval	Pearson's R	0.101	0.068	1.433	0.153 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	0.101	0.068	1.433	0.153 <sup>c</sup>
N of Valid Cases		200			

**Table 14: Risk estimation between waist height ratio and heaviness in head**

Risk Estimate	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Waist Height Ratio (Yes Avara / No Avara)	1.800	0.800	4.052
For Cohort Heaviness in Head = Yes	1.650	0.820	3.321
For Cohort Heaviness in Head = No	0.917	0.816	1.030
N of Valid Cases	200		

**Fatigue**

**Table 15: Cross tabulation between waist height ratio and Fatigue**

Crosstab			Fatigue		Total
			Yes	No	
Waist Height Ratio	Yes Avara	Count	18	94	112
		Expected Count	11.8	100.2	112.0
	No Avara	Count	3	85	88
		Expected Count	9.2	78.8	88.0
Total		Count	21	179	200
		Expected Count	21.0	179.0	200.0

Among the subjects with *Avara* waist height ratio, 18 had fatigue and 94 had no fatigue and among the subjects with no *Avara* waist height ratio, 3 had fatigue and 85 had no fatigue.

**Table 16: Chi-square test between waist height ratio and fatigue**

Chi-Square Tests	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.408 <sup>a</sup>	1	0.004		
Continuity Correction <sup>b</sup>	7.114	1	0.008		
Likelihood Ratio	9.453	1	0.002		
Fisher's Exact Test				0.004	0.003
Linear-by-Linear Association	8.366	1	0.004		



N of Valid Cases	200				
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Symmetric Measures		Value	Asymptotic Standardized Error <sup>a</sup>	Approximate T <sup>b</sup>	Approximate Significance
Interval by Interval	Pearson's R	0.205	0.056	2.948	0.004 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	0.205	0.056	2.948	0.004 <sup>c</sup>
N of Valid Cases		200			

Table 17: Risk estimation test between waist height ratio and fatigue

Risk Estimate	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Waist Hheight Ratio (Yes Avara / No Avara)	5.426	1.544	19.069
For Cohort Fatigue = Yes	4.714	1.434	15.495
For Cohort Fatigue = No	0.869	0.794	0.951
N of Valid Cases		200	

The value of fisher’s exact test is 0.004 which is statistically significant. The chi-square statistic (0.003) is similarly statistically significant. Therefore, it can be stated that subjects in case group, i.e., night duty workers are having fatigue.

**Confusion**

Table 18: Cross tabulation between waist height ratio and confusion

Crosstab		Confusion		Total
		Yes	No	
	Count	21	91	112

Waist Height Ratio	Yes Avara	Expected Count	11.8	100.2	112.0
	No Avara	Count	0	88	88
	Expected Count	9.2	78.8	88.0	
Total		Count	21	179	200
		Expected Count	21.0	179.0	200.0

Among the subjects with Avara waist height ratio, 21 had confusion and 91 had no confusion and among the subjects with a Avara waist height ratio, 0 had confusion and 88 had no confusion.

Table 19: Chi-square test between waist height ratio and confusion

Chi-Square Tests	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	18.436 <sup>a</sup>	1	.000		
Continuity Correction <sup>b</sup>	16.495	1	.000		
Likelihood Ratio	26.276	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	18.344	1	.000		
N of Valid Cases		200			

Symmetric Measures		Value	Asymptotic Standardized Error <sup>a</sup>	Approximate T <sup>b</sup>	Approximate Significance
Interval by	Pearson's R	.304	.035	4.484	.000 <sup>c</sup>

Interval					
Ordinal by Ordinal	Spearman Correlation	.304	.035	4.484	.000 <sup>c</sup>
N of Valid Cases		200			

**Table 20: risk estimate between waist height ratio and backache**

Risk Estimate	Value	95% Confidence Interval	
		Lower	Upper
For cohort Confusion = No	.813	.743	.888
N of Valid Cases		200	

The value of fisher’s exact test is 0.000 which is statistically significant. The chi-square statistic (0.000) is similarly statistically significant. Therefore, it can be stated that subjects in case group, i.e., night duty workers are having fatigue.

**Backache**

**Table 21: Cross tab between waist height ratio and backache**

Crosstab			Backache		Total
			Yes	No	
Waist Height Ratio	Yes Avara	Count	10	102	112
		Expected Count	7.8	104.2	112.0
	NO AVARA	Count	4	84	88
		Expected Count	6.2	81.8	88.0
Total		Count	14	186	200
		Expected Count	14.0	186.0	200.0

Among the subjects with Avara waist height ratio, 10 had backache and 102 had no backache and among the subjects with no Avara waist height ratio, 4 had backache and 84 had no backache.

**Table 22: Chi-square test between waist height ratio and back ache**

Chi-Square Tests	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.454 <sup>a</sup>	1	.228		
Continuity Correction <sup>b</sup>	.859	1	.354		
Likelihood Ratio	1.514	1	.218		
Fisher's Exact Test				.274	.178
Linear-by-Linear Association	1.447	1	.229		
N of Valid Cases		200			

Symmetric Measures		Value	Asymptotic Standardized Error <sup>a</sup>	Approximate T <sup>b</sup>	Approximate Significance
Interval by Interval	Pearson's R	.085	.066	1.204	.230 <sup>c</sup>
	Spearman Correlation	.085	.066	1.204	.230 <sup>c</sup>
N of Valid Cases		200			

**Table 23: Chi-square test between waist height ratio and back ache**

Risk Estimate	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Waist Hheight Ratio (Yes Avara / No Avara)	2.059	.623	6.801
For cohort Backache = Yes	1.964	.637	6.053
For cohort Backache = No	.954	.886	1.027
N of Valid Cases	200		

The value of fisher’s exact test is 0.274 which is statistically not significant. The chi-square statistic (0.178) is similarly statistically not significant. Therefore, it can be stated that subjects in case group,ie, night duty workers are having not having backache.

**Persistent tiredness**

**Table 24: cross tabulation between waist height ratio and persistent tiredness**

Crosstab			Persistent Tiredness		Total
			Yes	No	
Waist Height Ratio	Yes Avara	Count	11	101	112
		Expected Count	7.8	104.2	112.0
	No Avara	Count	3	85	88
		Expected Count	6.2	81.8	88.0
Total		Count	14	186	200
		Expected Count	14.0	186.0	200.0

Among the subjects with *avara* waist height ratio, 11 had persistant tiredness and 101 had no persistant tiredness and among the subjects with no *avara* waist height ratio, 3 had persistant tiredness and 85 had no persistant tiredness.

**Table 25: Chi-square test between waist height ratio and persistent tiredness**

Chi-Square Tests	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.113 <sup>a</sup>	1	.078		
Continuity Correction <sup>b</sup>	2.206	1	.138		
Likelihood Ratio	3.351	1	.067		
Fisher's Exact Test				.097	.066
Linear-by-Linear Association	3.097	1	.078		
N of Valid Cases	200				

Symmetric Measures		Value	Asymptotic Standardized Error	Approximate T <sup>b</sup>	Approximate Significance
Interval by Interval	Pearson's R	0.125	0.061	1.769	0.078 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	0.125	0.061	1.769	0.078 <sup>c</sup>
N of Valid Cases		200			

**Table 26: Risk estimation between waist height ratio and persistent tiredness**

Risk Estimate	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Waist Height Ratio (Yes Avara / No Avara)	3.086	0.834	11.423
For Cohort Persistent Tiredness = Yes	2.881	0.829	10.012
For Cohort Persistent Tiredness = No	0.934	0.868	1.004
N of Valid Cases	200		

The value of fisher’s exact test is 0.097 which is statistically not significant. The chi-square statistic (0.066) is similarly statistically not significant. Therefore, it can be stated that subjects in case group, i.e., night duty workers are not having persistent tiredness.

**Shareera Samhanana with respect to Waist Circumference and Symptoms**

**Tiredness**

**Table 27: Cross tabulation between waist circumference and tiredness**

Crosstab			Tiredness		Total
			Yes	No	
Waist Scale	Yes, Avara Waist	Count	41	28	69
		Expected Count	33.8	35.2	69.0
	No Avara – Waist	Count	55	72	127
		Expected Count	62.2	64.8	127.0
22.00	Count	2	2	4	
	Expected Count	2.0	2.0	4.0	
Total		Count	98	102	200

Expected Count	98.0	102.0	200.0
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Among the subjects with Avara waist scale, 41 had tiredness and 28 had no tiredness and among the subjects with no Avara waist scale, 55 had tiredness and 72 had no tiredness.

**Table 28: Chi square between waist circumference and tiredness**

Chi-Square Tests	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.647 <sup>a</sup>	2	.098
Likelihood Ratio	4.666	2	.097
Linear-by-Linear Association	.097	1	.755
N of Valid Cases	200		

Symmetric Measures		Value	Asymptotic Standardized Error	Approximate T <sup>b</sup>	Approximate Significance
Interval by Interval	Pearson's R	0.022	0.071	0.311	0.756 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	0.145	0.070	2.063	0.040 <sup>c</sup>
N of Valid Cases		200			

**Heaviness in head**

**Table 29: Cross tabulation between waist circumference and heaviness in head**

Crosstab			Heaviness In Head		Total
			Yes	No	
Waist Scale	Yes - Avara Waist	Count	18	51	69
		Expected Count	10.7	58.3	69.0

No Avara - Waist	Count	13	114	127
	Expected Count	19.7	107.3	127.0
22.00	Count	0	4	4
	Expected Count	.6	3.4	4.0
Total	Count	31	169	200
	Expected Count	31.0	169.0	200.0

Among the subjects with *Avara* waist scale, 18 had heaviness in head and 51 had no heaviness in head and among the subjects with no *Avara* waist scale, 13 had heaviness in head and 114 had no heaviness in head.

**Table 30: Chi square between waist circumference and tiredness**

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.325 <sup>a</sup>	2	.009
Likelihood Ratio	9.425	2	.009
Linear-by-Linear Association	1.768	1	.184
N of Valid Cases	200		

Symmetric Measures	Value	Asymptotic Standardized Error <sup>a</sup>	Approximate T <sup>b</sup>	Approximate Significance	
Interval by Interval	Pearson's R	.094	.016	1.332	.184 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	.216	.071	3.112	.002 <sup>c</sup>

N of Valid Cases	200			
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**DISCUSSION**

Majority of subjects 136 were having WHR abnormal (*Avara*) value. 64 subjects fell under the normal value i.e. (<0.5). This shows the increased prevalence of central obesity rather than peripheral obesity owing to the reason of sleeping patterns. Waist height ratio is the proven measurement to assess the health of an individual. Waist height ratio more than 0.5 is suggestive of risk of health among the individual. It also suggests the risk of cardiovascular symptoms like, hypertension, type 2 DM etc. Normal weight central obesity is the riskier aspect of health caused due to improper life style and food habits.

**Discussion on waist circumference of volunteers.**

Waist circumference is considered as the main anthropometric measurement to assess the health of an individual. The increase in the waist circumference would be due to the metabolic aberrations caused due to irregular sleep pattern and also sleeping during the day time.

**Discussion on results**

- Among the 200 subjects, who did night duty waist height ratio affected statistically adversely when compared to the 200 subjects who did not do night duty.
- Among the 200 subjects, who did night duty waist circumference statistically adversely when compared to the 200 subjects who did not do night duty.

**CONCLUSION**

The present study entitled as “A survey study on association between central obesity and *Ratri Jaagarana*” was as a survey study to find the association between night duty workers and central obesity of 200 subjects when compared with 200 subjects who did not do night duty. After a detailed literary review, clinical observation, analysis of data obtained and discussion, the following conclusions are drawn.

- Among the 200 subjects, who did night duty waist height ratio affected statistically adversely when compared to the 200 subjects who did not do night duty.
- Among the 200 subjects, who did night duty waist circumference statistically adversely when compared to the 200 subjects who did not do night duty.
- Among the anthropometric measurements, the subjects with adverse waist height ratio have more statistically adverse symptoms.
- Thus, subjects doing night duty are prone to central obesity, leading to adverse health effects.

Thus, research hypothesis is accepted and null hypothesis is rejected.

#### LIMITATIONS OF THE STUDY

- Dietary habit of there was not considered for the study.
- A more structured study including fixed samples from specific occupation may reduce the outliers and yields better results.

#### FURTHER RECOMMENDATIONS

- Similar type of comparative study among employees, its workers, factory worker, public transport, call canters can be done.

#### ANNEXURE

##### Questionnaire for assessing Ratri Jagarana

Night sleep patterns

1) Present shift

(1) Day shift

(2) Night shift

2) Since how long have you been engaged in night duty?

(1) More than 1 year

(2) Less than 1 year

3) What is the interval between two-night shift schedules?

(1) less than 1 week

(2) More than 1 week

4) What is the duration of your night duty time?

(1) 8 hrs

(2) 10-12 hrs

(3) 12 hrs

5) How often you are getting night duties for your job?

(1) Less than 10 days in a month

(2) More than 10 days in a month

6) Whether you work overtime

(1) Yes

(2) No

7) Do you take short naps in between your night duty?

(1) Yes

(2) No

Sleep quality

8) Do you get enough sleep after night duty?

(1) Yes

(2) No

9) How many hours do you sleep after night work?

(1) Less than 5 hours

(2) 6 hours – 8 hours

(3) More than 8 hours

10) After night shift do you experience any problem falling asleep in day?

(1) Yes

(2) No

(3) If yes-describe the problem

11) Which one of the following do you use to induce sleep after night shift?

(1) Alcoholic drinks

(2) Sleeping tablet

(3) Listen to the music

(4) Reading

- (5) Hot milk
- (6) None of the above
- 12) Does night shift affect your health in any way?
  - (1) Yes
  - (2) No
  - (3) I do not know
- 13) Which of the following you currently experience?
  - (1) Tiredness
  - (2) Indigestion
  - (3) Heaviness in the head
  - (4) Yawning
  - (5) Fatigue
  - (6) Confusions
  - (7) Giddiness
  - (8) Backache
  - (9) Persistent tiredness
  - (10) Loss of sleep
  - (11) None of the above
- 14) Do you have any of the following
  - Any chronic Systemic and Psychological illness :(1) yes (2) No  
If YES, specify - \_\_\_\_\_
  - Sleep Related Disorders :(1) yes (2) No  
If YES, mention the details - \_\_\_\_\_
  - Under long term medication ` :(1) yes (2) No  
If YES, specify - \_\_\_\_\_

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