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Original Research Article

Nutritional Status and Its Associated Factors among Elderly Lacto-Vegetarians of Budhanilkantha Municipality of Bagmati Nepal

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Abstract: Elderly lacto-vegetarians have been identified as a high-risk group of nutrient deficiency like Protein, Fat, carbohydrate, calcium, multivitamin etc., due to unbalanced eating pattern. A descriptive cross-sectional study has been conducted at Budhanilkantha Municipality among 113 respondents. Data was analyzed in statistical software like SPSS version 25 and Microsoft excel. The study showed that 33.6% respondents were overweight, 19.4% were obese and 46.9% were normal according to BMI. Waist Hip Ratio shows that (46.9%) of the respondents had Moderate health risk, (20.3%) were in high health risk and 32.7% were normal in healthy range. Waist Circumference shows that out of total respondents 33.9% had increased risk of metabolic complications among Male (14.6%) and Female (19.2%). 61% of respondents were at the substantially increased risk of metabolic complications, Male (11.3%) and Female (49.7%). Factor such as Calories intake (P=0.00), fat intake (P=0.00), Gender (P=0.002), Ethnicity (P=0.00), Education level (P=0.00), Religion (P=0.000), Meal Intakes (P=0.00), Skipping Meals (P=0.00), carbohydrate intake (P=0.00), protein intake (P=0.00), were found to be statistically significant with Nutritional Status according to WHR. Factor such as Carbohydrate intake (P=0.019), Protein intake (P=0.00), were found to be statistically significant with Nutritional Status according to BMI. Majority of elderly lacto-vegetarian respondents were overweight and obese according to BMI and WHR shows health risk as well. Associated factors of Nutritional status are Gender, Religion, Ethnicity, Education level, Calories, Fat, Protein, and Carbohydrate.

Keywords: Lacto-vegetarianism; Elderly People; Nutritional Status.

1. INTRODUCTION

Lacto-vegetarianism is a specific type of vegetarian diet that excludes all types of meat, poultry, and seafood while allowing for the consumption of dairy products. Primary sources of protein, calcium, and other nutrients are derived from dairy foods like milk, yogurt, and cheese, as well as plant-based sources like vegetables, fruits, grains, legumes, and nuts. Lacto-vegetarianism is a dietary choice that provides numerous health benefits while aligning with ethical and environmental concern. Elderly people are quite different compared to other age groups because with age different physical, metabolic, and psychological changes start to occur (Mahara, Devkota, Pudasaini, & Jaisee, 2023). It means that their physical activities, metabolic activities, digestion, and bone & muscle mass starts to drop significantly. Due to the loss of an appetite combined with the loss of taste, elderly people are vulnerable to diseases that are associated with immunity because they consume lesser food with deficiency of nutrients. Therefore, they need to be properly planned and guided in terms of dietary planning. On top of maintaining their diet, they need to regularly exercise which can avoid many kinds of degenerative diseases that are likely to affect older people. Elderly lacto-vegetarians may be at risk of inadequate protein, vitamin B12, calcium, and iron. Nutrient's deficiency can lead to various health issues, including anemia, bone health concerns and cognitive decline. Maintaining a well-balanced diet with a variety of plant-based foods is essential.

A Longitudinal study conducted in Australia assessed to 'Plant based dietary patterns are associated with lower body weight, BMI, and WC in older Australian women'. 64% of the sample was overweight/obese, Cross-sectional analysis of this sample revealed that women who followed a Plant Based Diet had significantly lower Body Weight, BMI, and WC. Adjusting for confounders such as physical activity levels, smoking status, habitual alcohol intake, and supplement use generated healthy outcomes (Mahara, Devkota, Bhatta, & Pudasaini, 2023).

2. Objectives of the Study

2.1 ***General Objective***

The general objective of this study is to assess the nutritional status and its associated factors among the elderly lacto-vegetarian residing in Kathmandu Valley.

2.2 ***Specific Objectives***

- To assess nutritional status of elderly lacto-vegetarians.
- To determine nutrient intake of elderly lacto-vegetarians.
- To find factors associated with Nutritional status among elderly lacto-vegetarians.

3. MATERIALS AND METHODS

Study Design: The study design was descriptive cross-section.

Study Area: The study was conducted in the Budhanilkantha Municipality of Kathmandu district of Bagmati province.

Study Population: The study population were elderly people who are above 59 years of age.

Study Sample:

The sample of the study was 113 respondents. This sample was taken because we didn't get the exact numbers of the elderly people as per the annual report of municipality there were only 200 respondents, among them 20 were died and most of them had migrated to different places. So, we consult to the guide and take the sample of 113 respondents.

Data Collection Tools and Techniques:

The verbal consent was taken for the data collection from the respondents. Fully structure questionnaire was used for the data collection. Face to face interview method was used for the data collection. To asses Nutritional Status through anthropometry measurement / tools, like BMI (Body mass index), WHR (Waist Hip Ratio), and WC (Waist Circumference). Anthropometry tool used following instruments: -

- Weight (weighing machine was used with maximum capacity of 180 kg)
- Height (Stadiometer was used with maximum capacity of 2 m)
- Hip and Waist circumference (measuring tape was used)
- Calories intake and Nutrient intake was analyzed by using 24 hrs. Recall and food frequency.

Sampling Techniques:

For the data collection snow ball sampling techniques was used, this was due to the reason that most of the elderly people were unknown in that place.

Data Analysis: Thus collected data were entered into MS-Excel 2016 and transferred to SPSS V22 for the analysis.

Inclusion and Exclusion Criteria:

The respondents who were above 59 years of age as well as were the residents of Budhanilkantha Municipality who provide us consent for the study were in my inclusion criteria.

Similarly, those respondents who were above the 59 years of age and didn't provide us consent for the study and were unable to talk were the excluded in my study.

Ethical Consideration:

For the ethical consideration of the study:

Consent was taken from the University campus
Consent was taken from the respective department
Before data collection consent was taken from the respective respondent
No environmental harm activities were done during the study periods.

4. RESULT AND DISCUSSION

4.1. Result

Table 1: Socio-demographic Factors

Gender	**Frequency**	**Percent (%)**
Male	46	40.7
Female	67	59.3
Ethnicity		
Brahmin	46	40.70%
Chettari	26	23%
Madhesi	5	4.40%
Janjati	35	31%
Gurung	1	0.80%
Age Category		
60-70	92	81.40%
71-80	17	15%
81-90	4	3.50%

Table 1 illustrates that greater percentage of respondents were Female (59.3%) and male (40.7%). Majority of respondents (81.4%) belonged to age group 60-70 years. (40.7%) were Brahmin, 16.8% were male and 23.8% were female. Minimum of respondents (0.8%) were Gurung.

Table 2: Education level among the respondents

Education Level	**Male**	**Female**	**Total (%)**
Primary	9 (7.96%)	34 (30%)	43 (38%)
Secondary	11 (9.7%)	7 (6.19%)	18 (15.9%)
Higher Secondary	7 (6.19%)	20 (17.6%)	27 (23.8%)
Bachelor	7 (6.19%)	3 (2.65%)	10 (8.8%)
Masters	12 (10.6%)	3 (2.65%)	15 (13.3%)

Table 2 illustrates majority of the respondents (38%) passed Primary level of education where the percentage of Female (30%) were found to be more than male (7.96%).

Table 3: Distribution of occupation of the respondents

Occupation	**Male**	**Female**	**Total (%)**
Housewife	0	37 (32.7%)	37 (32.7%)
Farmer	8 (7%)	10 (8.84%)	21 (18.5%)
Business	19 (16.8%)	9 (7.96%)	28 (24.7%)
Teacher	5 (4.42%)	1 (0.8%)	6 (5.3%)
Shopkeeper	1 (0.8%)	4 (3.53%)	5 (4.4%)
Public Service	9 (7.96%)	3 (2.65)	12 (10.6%)
Others	4 (3.53%)	0	4 (3.2%)

Table 3 illustrates greater number of respondents were housewife (32.7%).

Table 4: Duration of being lacto-vegetarian among respondents

Lacto-Vegetarian Duration	**Male**	**Female**	**Total (%)**
1-20 years	18 (15.9%)	37 (32.74%)	55 (48.6%)
21-40 years	11 (9.7%)	17 (15%)	28 (24.7%)
41-60 years	7 (6.1%)	3 (2.65%)	10 (8.84%)
61-80 years	9 (7.9%)	10 (8.84%)	19 (16.8%)
81-100 years	1 (0.8%)	0	1 (0.8%)

Above table illustrates the duration of being Vegetarian of the respondents. The majority of the respondents (48.6%) were vegetarian between 1 to 20 years of age, were 15.9% male and 32.74% were female.

Table 5: Distribution of motivating factors of being lacto-vegetarian

Motivating Factor	Male	Female	Total (%)
Religion	9 (7.9%)	2 (1.7%)	11 (9.7%)
Spirituality	25 (22.1%)	42 (37.1%)	67 (59.2%)
Health	7 (6.2%)	11 (9.7%)	18 (15.9%)
Others	5 (4.4%)	12 (10.6%)	17 (15%)

The above table showed that higher number of respondents 59.2% were motivated by spirituality, among them 37.1% were female and 22.1% were mal.

Table 6: Nutritional Status of the respondents according BMI

Nutritional Status	Male	Female	Total (%)
Normal weight	25 (22.1%)	28 (24.7%)	53 (46.9%)
Overweight	14 (12.3%)	24 (21.2%)	38 (33.6%)
Obese	7 (6.1%)	15 (13.2%)	22 (19.4%)

Out of the total respondents, 46.9% were found to be Normal weight, 33.6% were found to be overweight and 19.4% were found to be obese. Obesity was found to be prevalent among Female (13.2%) Compared to male (6.1%).

Table 7: Nutritional Status of the respondents according WHR

Nutritional Status	Male	Female	Total
Normal	18 (15.9 %)	19(16.8%)	37 (32.7%)
Moderate Risk	13 (11.5%)	40 (35.3%)	53 (46.9%)
High Risk	15 (13.2%)	8 (7%)	23 (20.3%)

Out of the total respondents, 32.7% were found to be Normal weight, 46.9% were at Moderate Risk, and 20.3% were at High Risk. Male (13.2%) were more susceptible to obesity compared to female (7%).

Table 8: Waist Circumference risk of metabolic complications among the lacto-vegetarian respondents

Risk of metabolic complications	Increased	Substantially increased
Male (46)	13 (14.6%)	10 (11.3%)
Female (67)	17 (19.2%)	44 (49.7%)
Total (113)	30 (33.9%)	54 (61%)

Out of total respondents 33.9% were increased risk of metabolic complications, among them 14.6% were Male and 19.2% were Female. Similarly, 61% of respondents were at the substantially increased risk of metabolic complications, among them 11.3% were Male and 49.7% were Female.

Table 9: Meal intake of the respondents

Number of Meals	Male	Female	Total (%)
Twice a Day	17 (15%)	30 (26.54%)	47 (41.59%)
Thrice a Day	20 (17.6%)	32 (28.31%)	52 (46%)
Four times a Day	9 (7.96%)	5 (4.42%)	14 (12.3%)

According to the data, the number of respondents who consumed meal thrice a day was 46%.

Table 10: Skipping meal by respondents

Variables	Male	Female	Percent (%)
Skipping Meal			
Yes	27 (23.89%)	47 (41.59%)	74 (65%)
No	19 (16.8%)	20 (17.69%)	39 (34.5%)
Meal Skipped			
Breakfast	11 (9.7%)	20 (17.69)	31 (41.8%)
Lunch	4 (3.5%)	5 (4.42%)	9 (12.1%)
Dinner	12 (10.6%)	22 (19.46%)	34 (45.9%)
Reason for meal skipping			
No interest to have meal	15 (13.27%)	27 (23.89%)	42 (56.7%)
Others	12 (10.6%)	20 (17.69%)	32 (43.2%)

Majority (65%) stated they did skip meals and a 34.5% reported they did not skip meals.

Table 11: Frequency of Fruits consumed by Respondents

Consumption	Male	Female	Total (%)
None	0	1 (0.8%)	1 (0.8%)
Once a day	26 (23%)	42 (37.1%)	68 (60.1%)
Twice a day	20 (17.6%)	22 (20.3%)	42 (37.1%)
Thrice a day	0	2 (1.7%)	2 (1.7%)

Above table illustrates the fruits consumed by respondents. The majority of respondents (60.1%) were found to be consuming fruit once a day.

Table 12: Type of Fruits consumed by respondents

Fruits	Male	Female	Total (%)
Seasonal fruits	45 (39.82%)	64 (56.63%)	109 (96.4%)
Non- seasonal fruits	1 (0.8 %)	3 (2.65%)	4 (3.5%)

Majority of respondents (96.4%) were consuming seasonal fruits and minority respondents were consume non-seasonal fruits as well in their diet in daily basis.

Table 13: Frequency of Cereals consumed by Respondents

Consumption	Male	Female	Total (%)
One time	0	1 (0.8%)	1 (0.8%)
two time	45 (39.8%)	65 (57.5%)	110 (97.3%)
three time	1 (0.8%)	1 (0.8%)	2 (1.7%)

Above table shows the consumption of cereals among respondents. Most of the respondents (97.3%) consumed cereals twice a day, and only 0.8% were consuming cereals once a day.

Table 14: Distribution of cereals consumed by respondents

Types of cereals	Male	Female	Total (%)
Rice and wheat	17 (15%)	19 (16.81%)	36 (31.8%)
Rice	25 (22.12%)	41 (36.28%)	66 (58.4%)
Rice, Millet, Maize, Wheat	3 (2.65%)	5 (4.42%)	8 (7%)
Rice, Wheat, Maize, Millet, Buckwheat, Samak, and Barley	1 (0.8%)	2 (1.76)	3 (2.6%)

Majority of respondents consumed rice (58.4%)

Table 15: Frequency of Pulses consumed by Respondents

Consumption	Male	Female	Total (%)
One time	4 (3.5%)	18 (16%)	22 (19.4%)
Two time	42 (37.2%)	49 (43.3%)	91 (80.5%)

Above table demonstrates that 80.5% of respondents consumed pulses twice a day.

Table 16: Frequency of Vegetables consumed by Respondents

Consumption	Male	Female	Total (%)
One time	2 (2%)	6 (5.3%)	8 (7%)
Two time	42 (37%)	56 (50%)	98 (86.7%)
Three time	2 (2%)	4 (4%)	6 (5.3%)
Others	0	1 (0.8%)	1 (0.8%)

The above table illustrated the consumption of vegetables twice a day among respondents was high (86.7%).

Table 17: Frequency of Nuts consumed by Respondents

Consumption	Male	Female	Total (%)
One time	36 (32%)	57 (50.4%)	93 (82.3%)
Two time	9 (8%)	6 (5.3%)	15 (13.2%)
No	1 (0.8%)	4 (4%)	5 (4.4%)

Majority of the respondents (82.3%) consumed nuts once a day, and a smaller number of respondents 4.4% did not consume nuts every day.

Table 18: Frequency of Ghee consumed by Respondents

Consumption	Male	Female	Total (%)
½ Tablespoon	10 (8.8%)	25 (22.1%)	35 (30.9%)
1 Tablespoon	26 (23%)	33 (29%)	59 (52.2%)
2 Tablespoons	8 (7%)	5 (4.4%)	13 (11.5%)

Respondents who consume ½, 1, and 2 tablespoons of ghee were 30.9 %, 52.2 %, and 11.5 %, respectively.

Table 19: Frequency of drinking water by Respondents

Consumption	Male	Female	Total (%)
0.5 Liter	2 (2%)	5 (4.4%)	7 (6.1%)
1 Liter	9 (8%)	13 (12%)	22 (19.4%)
1.5 Liters	8 (7%)	7 (6%)	15 (13.2%)
2 Liters	16 (14%)	18 (16%)	34 (30%)
2.5 Liters	7 (6.19%)	19 (17%)	26 (23%)
3 Liters	4 (3.5%)	5 (4.4%)	9 (7.9%)

Majority (30%) of them drink 2 liters a day, and minority (6.1%) of them drink only 0.5 liter a day.

Table 20: Frequency of Dairy Product consumed by respondents

Consumption	Male	Female	Total (%)
None			
Once a day	26 (23%)	42 (37.16%)	68 (60.1%)
Twice a day	20 (17.69%)	22 (19.46%)	42 (37.1%)
Thrice a day	0	2 (1.76)	2 (1.7%)

Majority of respondents (60.1%) were consuming dairy product once a day. Twice a day consuming respondent were 37.1%.

Table 21: Frequency of the Dairy Product consumed by respondents

Types	Male	Female	Total (%)
Milk, Curd, Cheese, Paneer	43 (38%)	64 (56.6%)	107 (94.6%)
Milk, Cheese, Paneer	1 (0.8%)	1 (0.8%)	2 (1.7%)
Others	2 (1.76%)	2 (1.76%)	4 (3.53%)

Majority of respondents (94.6%) were consuming milk, curd, cheese and paneer. Others (3.53%) were chosen different products like paneer, buttermilk, ghee, milk only.

Table 22: Distribution of regularly consume meat replacement by respondents

Replaced by	Male	Female	Total (%)
Beans, Legumes, seeds, nuts, sprouted beans, milk and its products	60 (53%)	52 (46%)	112 (99.1%)
Beans, legumes, seeds, nuts, sprouted beans, milk and its products, Tofu, soya bean	0	1 (0.8%)	1 (0.8%)

The Majority of respondents (99.1%) consume beans, legumes, seeds, nuts, sprouted beans, milk and its products.

Table 23: Average calories intake of Respondents

Respondents	Average Intake (Kcal)
Male	1622 Kcal
Female	1410 Kcal

The above table illustrates the average Calories intake of Male were 1622 kcal and Female were 1410 kcal.

Table 24: Calories intake of respondents as per recommended

Calories Intake	Male	Female	Total (%)
Lower than recommended	40 (35.3%)	54 (47.7%)	94 (83%)
Adequate	6 (5.3%)	11 (9.7%)	17 (15%)
Higher than recommended	0	2 (1.7%)	2 (2%)

Out of the total respondents 83% were found consuming lower than recommended, among them 47.7% were Female and 35.3% were male. 15% of respondents were found consuming adequate amount of calories, among them 9.7% were female and 5.3% were male. Respondents (2%) were found consuming higher than recommended.

Table 25: Average Protein intake of Respondents

Respondents	Average Intake (gm.)
Male	65 gm.
Female	53 gm.

The above table illustrates the average Protein intake of Male were 65 gm. and Female were 53 gm.

Table 26: Protein intake of respondents as per recommended

Protein Evaluation	Male	Female	Total (%)
Lower than recommended	9 (7.9%)	20 (17.6%)	29 (25.6%)
Adequate	22 (19.4%)	33 (29.2%)	55 (48.6%)
Higher than recommended	15 (13.2%)	14 (12.3%)	29 (25.6%)

Out of the total respondents (25.6%) were found consuming lower than recommended, among them 17.6% were female and 7.9% were male 48.6% respondents were found consuming adequate amount, among them 29.2% were female and 19.4% were male. 25.6% respondents were found consuming higher than recommended, among them 12.3% were female and 13.2% were male.

Table 27: Average Fat intake of Respondents

Respondents	Average Intake (gm.)
Male	47 gm.
Female	41 gm.

The above table illustrates the average Fat intake of Male were 47 gm. and Female were 41 gm.

Table 28: Fat intake of respondents as per recommended

Fat Intake	Male	Female	Total (%)
Lower than recommended	15 (13.2%)	32 (28.3%)	47 (41.5%)
Adequate	9 (7.9%)	12 (10.6%)	21 (18.5%)
Higher than recommended	22 (19.4%)	23 (20.3%)	45 (39.8%)

Out of the total respondents 41.5% were found consuming lower than recommended. 18.5% respondents were found consuming adequate and 39.8% respondents were found consuming higher than recommended.

Table 29: Average Carbohydrate intake of Respondents

Respondents	Average Intake (gm.)
Male	284 gm.
Female	248 gm.

The above table illustrates the average Carbohydrate intake of Male were 284 gm. and Female were 248 gm.

Table 30: Carbohydrate intake of respondents as per recommended

Carb. Intake	Male	Female	Total (%)
Lower than recommended	15 (13.2%)	24 (21.2%)	39 (34.5%)
Adequate	2 (1.7%)	2 (1.7%)	4 (3.5%)
Higher than recommended	29 (25.6%)	41 (36.2%)	70 (62%)

Out of the total respondents, 34.5% were found consuming lower than recommended, 3.5% respondents were found consuming adequate and 62% respondents were found consuming higher than recommended.

Table 31: Distribution of Smoking habit and Alcohol consumption

Factors	Male	Female	Total (%)
Alcohol			
Yes	0	1 (0.8%)	1 (0.8%)
No	46 (40.7%)	66 (58.4%)	112 (99.1%)

Factors	Male	Female	Total (%)
Smoking			
Yes	1 (0.8%)	4 (3.5%)	5 (4.42%)
No	45 (39.8%)	63 (55.75%)	108 (95.57%)

Above table illustrates that the majority (99.1%) of the respondents were nonalcoholic. Majority (95.57%) of respondents were non-smokers.

Table 32: Distribution of smoking habit of respondents

Smoking	Male	Female	Total (%)
Twice a day	0	1 (0.8%)	1 (0.8%)
Thrice a day	1	3 (0.8%)	4 (3.5%)

Majority of respondents were not smoking (95.5%), remaining (4.3%) were smoking twice a day (0.8%) and thrice a day smoke by (3.5%).

Table 33: Distribution about Physical activities of respondents

Types of physical Activities	Male	Female	Total (%)
Walking	45 (39.8%)	67 (59.2%)	112 (99.1%)
Jogging	1 (0.8%)	0	1 (0.8%)

99.1% of them walked on a regular basis and remaining 0.8% were used to do jogging only.

Table 34: Distribution of walking time

Walking (min)	Male	Female	Total (%)
0	2 (1.76%)	0	2 (1.8%)
15	1 (0.8%)	0	1 (0.8%)
20	1 (0.8%)	1 (0.8%)	2 (1.8%)
30	12 (10.61%)	35 (30.97%)	47 (41.2%)
35	1 (0.8%)	0	1 (0.9%)
45	1 (0.8%)	0	1 (0.9%)
60	20 (17.69%)	15 (12.38%)	35 (30.7%)
120	8 (7%)	15 (12.38%)	23 (20.2%)
180	0	1 (0.8%	1 (0.9%)

Above table illustrates that 0.9% of respondents were not walking at all. Whereas 1.8%, 1.8%, 41.2%, 0.9%, 30.7%, 20.2%, 0.9% were walking 15, 20, 30, 35, 45, 60. 120, and 180 minutes every day.

Table 35: Distribution of duration about Jogging

Jogging	Male	Female	Total (%)
0	60 (53%)	52 (46%)	112 (99.1%)
60	1 (0.8%)	0	1 (0.8%)

99.1% respondents were not jogging as physical activity.

Table 36: Distribution of nutritional deficiency, supplement intake, and doctors' visit

Factors	Male	Female	Total (%)
Nutritional Deficiency			
Yes	9 (7.9%)	20 (17.6%)	29 (25.6%)
No	37 (32.7%)	47 (41.59%)	84 (74.3%)
Taking supplement			
Yes	9 (7.9%)	20 (17.6%)	29 (25.6%)
No	37 (32.7%)	47 (41.5%)	84 (74.3%)
Visit doctor			
Every 6 month	4 (3.5%)	8 (7%)	12 (10.6%)
When get sick	42 (37.1%)	59 (52.2 %)	101 (89.3%)

The study showed that majority (74.3%) of respondents had no nutrient deficiency. Majority respondents (89.3%) visit doctor when they get sick.

Table 37: Distribution of diabetes, hypertension, and both among lacto-vegetarian respondents

Diseases	Male	Female	Total (%)
Diabetes	3 (2.6%)	3 (2.65%)	6 (5.3%)
Hypertension	5 (4.4%)	16 (14.1%)	21 (18.5%)
DM + Hypertension	3 (2.65%)	5 (4.4%)	8 (7%)
Non disease condition	35 (30.9%)	43 (38%)	78 (69%)

According to the above table, 5.3% of the respondents were suffering from diabetes. Similarly, 18.5% respondents were suffering from hypertension. The study showed that 7% of them were suffering from both DM & Hypertension.

Table 38: Dietary intake associated with Nutritional Status (BMI) among the lacto-vegetarian respondents

Factor	Normal wt.	Overweight	Obese	Chi-square	P-value
Carbohydrate					
Lower than recommended	12	15	12	11.75	0.019*
Adequate	2	0	2		
Higher than recommended	39	23	8		
Protein					
Lower than recommended	9	14	6	20.53	0.00*
Adequate	21	18	16		
Higher than recommended	23	6	0		

**Statically significant (P<0.05)*

Carbohydrate (P=0.019) and Protein (P=0.00) were found to have a relation with BMI among the Lacto-vegetarian respondents who were residents of Budhanilkantha Municipality.

Table 39: Socio-demographic factors associated with WHR among the lacto-vegetarian respondents

Factors	Normal	Moderate risk	High risk	Chi-square	P-value
Gender					
Male	18	13	15	12.4	0.002*
Female	19	40	8		
Education Level					
Primary	9	26	8	123.07	0.000*
Secondary	8	6	4		
Higher Secondary	11	11	5		
Bachelors	3	3	4		
Masters	6	7	2		
Ethnicity					
Brahmin	10	24	12	135.3	0.000*
Chettari	5	16	5		
Janjati	18	12	5		
Madhesi	4	1	0		
Gurung	0	0	1		
Religion					
Hinduism	23	53	23	114	0.000*
Marital Status					
Single	4	8	5	115.3	0.00
Married	33	45	18		

**Statically significant (P<0.05)*

Gender (P=0.002), Education level (P=0.00), Ethnicity (P=0.00), Religion (P=0.00) and Marital status (P=0.00) were found to have a relation with.

Table 40: Dietary Pattern associated with WHR among the lacto-vegetarian respondents

Factors	Normal	Moderate risk	High risk	Chi-square	P-value
Meal Intakes					
Twice a Day	14	21	12	121.945	0.00
Thrice a Day	21	21	10		
Four times a Day	2	11	1		
Skipping Meal					
Yes	24	32	18	116.299	0.00
No	13	21	5		

**Statically significant (P<0.05)*

There is association of WHR with Meal intakes (P=0.00) and Skipping Meals (P=0.00).

Table 41: Dietary intake associated with WHR among the lacto-vegetarian respondents.

Factors	Normal	Moderate risk	High risk	Chi-square	P-value
Calories					
Lower than recommended	32	43	19	115.33	0.00*
Adequate	4	9	4		
Higher than recommended	1	1	0		
Fat					
Lower than recommended	18	20	9	116.25	0.00*
Adequate	5	10	6		
Higher than recommended	14	23	8		
Carb					
Lower than recommended	12	15	12	118.5	0.00*
Adequate	1	2	1		
Higher than recommended	24	36	10		
Protein					
Lower than recommended	7	16	6	116.9	0.00*
Adequate	22	22	11		
Higher than recommended	8	15	6		

**Statically significant (P<0.05)*

Calories (P=0.00), fat (P=0.00), carbohydrate (P=0.00) and protein (P=0.00) were found to have a relation with WHR.

Table 42: Dietary Pattern associated with Nutritional Status (WHR) among the Lacto-Vegetarian respondents

Factor	Normal	Moderate risk	High risk	Chi-square	P-value
Consume Dairy products					
None	0	1	0	121.63	0.00*
Once a day	19	32	17		
Twice a day	16	20	6		
Thrice a day	2	0	0		
Consume vegetable					
Once a day	2	5	1	116.85	0.00*
Twice a day	32	45	21		
Thrice a day	3	3	1		
Consume Cereals					
Once a day	0	1	0	115.76	0.00*
Twice a day	36	51	23		
Thrice a day	1	1	0		
Consume Pulses					
Once a day	6	10	6	114.91	0.00*
Twice a day	31	43	17		
Consume Nuts					
None	0	3	2	117.25	0.00*
Once a day	31	44	18		
Twice a day	6	6	3		

**Statically significant (P<0.05)*

Consume dairy products (P=0.00), Consume vegetables (P=0.00), Consume cereals (P=0.00), Consume pulses (P=0.00), Consume nuts (P=0.00). There is association between dietary pattern and WHR.

4.2. Discussion

The present study shows that 46.90% of the respondents were to be normal weight, 33.6% were overweight, and 19.4% were obese according to BMI. The obesity was found to be prevalent among female (34.5%) compared to male (18.57%) in elderly lacto-vegetarians, where the BMI of female is higher than male. This Findings are similar, a study conducted in England shows that the women with BMI more than or equal to 30 were 29.1%; whereas the same data for men was 23.4 % (Hubbard *et al*., 2010), in Netherland BMI was found differ significantly between genders, with men having 23.5±3.4 and women having 24.7±2.9 (Löwik *et al*., 1990), are contrast with this present study, in Taiwan 20.2% of the elderly were underweight (Poda *et al*., 2019), in Haryana 40% were malnutrition, 36.5% were at risk of malnutrition, and 23.5% were normal (Kalyan *et al*., 2015).

The present study indicates that out of total respondents 33.9% were increased risk of metabolic complications, among them 14.6% were Male and 19.2% were Female according to Waist Circumference. Similarly, 61% of respondents were at the substantially increased risk of metabolic complications, among them 11.3% were Male and 49.7% were Female. This study showed that more females are suffering from abdominal obesity than male. These findings are similar with others findings, the study conducted in Netherland shows that women tend to be relatively obese compared to men (Löwik *et al*., 1990).

Calories consumed by Lacto-vegetarian respondents, out of the total respondents 94 (83%) were found lower than recommended, 17 (15%) were found Adequate and 2 (2%) were found higher than recommended. The average calories of male were 1622 kcal and female were 1410 kcal. The findings are similar with others finding, in Netherland Vegetarian men consumed more energy than women (Brants *et al*., 1990), In Netherland Vegetarians consume less total calories (Löwik *et al*., 1990).

Protein consumed by Lacto-vegetarian respondents, out of the total respondents 29 (25.6%) were found lower than recommended, 55 (48.6%) were found Adequate and 29 (25.6%) were found higher than recommended. The findings are similar, in Netherland Vegetarians consumed more animal protein; both in grams and as a percentage of energy (Brants *et al*., 1990), in Taiwan 6.6% of the elderly had protein malnutrition (Poda *et al*., 2019). The findings are contrast, in China Elderly Chinese vegetarians consume fewer total protein than comparable non-veg and in Netherland Vegetarians consume less Protein (Löwik *et al.*, 1990).

Fat consumed by Lacto-vegetarian respondents, out of the total respondents 47 (41.5%) were found lower than recommended, 21 (18.5%) were found Adequate and 45 (39.8%) were found higher than recommended. These findings are similar, in Netherland Fat consumption was more (Brants *et al.*, 1990). The findings are contrast, in Netherland Vegetarians consume less fat (Löwik *et al*., 1990).

Carbohydrate consumed by Lacto-vegetarian respondents, out of the total respondents 39 (34.5%) were found lower than recommended, 4 (3.5%) were found Adequate and 70 (62%) were found higher than recommended. These findings are similar and in China Elderly Chinese vegetarians consume more carbohydrate in comparison to non-vegetarian (Woo *et al*., 1998). These findings are contrast, in Netherland the intake of total carbohydrate was slightly lower than recommended (Brants *et al*., 1990),

Calories intake (P=0.00), fat intake (P=0.00), Gender (P=0.002), carbohydrate intake (P=0.00), protein intake (P=0.00), were found to have a relation with WHR. Carbohydrate intake (P=0.019), Protein intake (P=0.00), were found to have a relation with BMI. These findings are similar with, in Taiwan Nutritional status variables, BMI, and dietary intake score, had significantly positive correlations at P 0.001. Gender and dietary habit are associated with older adults' nutritional status (Poda *et al*., 2019).

Supplement were taken by 29 (25.6%) along with deficiency, among them 9 were male and 20 were female. The findings are contrast with this finding, because maximum number of respondents used to take supplements, in Netherland among 44 respondent's twenty (45.4%) respondents took nutritional supplements on a regular basis; 4 men and 16 women (Brants *et al*., 1990).

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

The study concluded that there is high prevalence of over nutrition among the elderly respondent according to BMI and WHR. Abdominal fat is significantly higher leading to obesity according to WC. The requirement of protein and fat is satisfactorily met with high carbohydrates and low calories consumption. As sociated factors of Nutritional status are Gender, Religion, Ethnicity, Education level, Meal Intakes, Skipping Meals, Calories, Fat, Protein, Carbohydrate, consume dairy products, vegetables, cereals, pulses, and nuts.

5.2. Recommendation

After conducting the research and analyzing the data, this study came to aforementioned conclusions. After thorough investigation, several recommendations have been formulated as follows:

i. Elderly people who are lacto-vegetarian people need to exercise on a daily basis along with an appropriate intake of calories.
ii. Consumption of fat needs to be decreased in accordance with the Recommended Daily Allowance.
iii. Frequent health check-ups are vital to avoid sudden health issues rather than going to a doctor when a grave issue has overcome the health. Such visits to doctors can significantly help mitigate any health problem on time that may arise in future.
iv. This study will be helpful to establish a solid research ground for any future research work.

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