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LOW BACK ACHE UBIQUITIES AND ITS RELATION IN URBAN RESIDENTS OF HARYANA

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Abstract: **Background:** Low back pain (LBP) is an extremely common problem that most people experience at some point in their life. Low back pain may arise from any one of a few anatomical structures, including bones, intervertebral discs, joints, ligaments, muscles, neural structures, and blood vessels. **Objective**: To find out over-all, age specific, gender specific prevalence of LBP in urban population of Haryana. **Methodology:** It is a cross sectional survey study in which 1503 subjects of age above 30yrs were included. **Result:** Data analysis was done using SPSS 21. It was found that female sex, illiterate, matric/post-matric, pre-diabetes was significantly increased the odds of LBP prevalence. **Discussion:** Present study results like female gender, smoking, low education, low income, waist circumference as risk factors for LBP is supported by 2 Indian studies with large sample size (i.e.) more than 6000 aged 50 years or more (Williams et al., 2015; Koyanagi et al., 2015). **Conclusion:** The present study can be concluded by mentioning that one year self-reported LBP prevalence is 19.0% in Hisar urban population. Also, female sex, high waist circumference, low education, lack or reduced of ghee use, high FBG are identified as risk factors for developing LBP in urban population.

***IndexTerms* - low back pain, urban, prevalence, survey**

INTRODUCTION

Low back pain (LBP) is an extremely common problem that most people experience at some point in their life. Globally LBP is the leading cause of years lived with disability in 1990, 2010 and 2013 (Vos et al., 2012 and 2015). It creates a substantial personal, community and financial burden globally (Hoy et al., 2010; Deyo et al., 1991). LBP is the leading cause of activity limitation and work absence leading to change the jobs (Palazzo et al., 2014).It causes an enormous economic burden on individuals, families, communities, industry and governments (Woolf and Pfleger, 2003; Steenstra et al., 2005; Dagenais et al., 2008; Schofield et al., 2011).

It is defined as a nonspecific condition that refers to complaints of acute or chronic pain and discomfort in or near the lumbosacral spine, which can be caused by inflammatory, degenerative, neoplastic, gynecological, traumatic, metabolic and other type of disorders (Last and Wallace, 1992). It can be defined as pain, muscle tension, or stiffness, localized below the costal margin and above the inferior gluteal folds, with or without referred or radicular leg pain (sciatica) also (Van der Heijden et al., 1991).

LBP may be due to involvement of the vertebral bodies, intervening discs, ligaments, muscles, nerves, or other structures in the spine. The pain may be constant or intermittent, experienced in one site or radiating to other areas (Nazeer et al., 2015). Many episodes of low back pain are disabling, thus making it one of the costly occupational health problem. However, in workplace, occupational risk factors such as forceful exertions during manual materials handling, awkward trunk postures and whole body vibration are often associated with development of back pain (Last and Wallace, 1992). The relative contribution of these occupational risk factors is determined by some non occupational factors such as obesity, smoking, family history of musculoskeletal disorders, duration of exposure to occupational risk factors, past history of trauma to spine, and so on (Boshuizen et al., 1993; Deyo and Bass, 1989).

Prevalence

Globally the point prevalence of LBP is 12–33% and 1-year prevalence is 22–65% (Walker, 2000). Globally back pain causes more disability than any other condition. The 2010 Global Burden of Disease Study ranked low back pain as the condition with the highest number of years lived with disability and sixth in terms of disability-adjusted life years (Hoy et al., 2014; Murray et al., 2012).With rapid growth in the numbers and proportions of older adults in low- and middle-income countries the back pain burden in older adults in these countries is expected to grow significantly in coming decades (Hoy et al., 2014; Murray et al., 2012). Most of the information about back pain has come from developed countries in Europe, North American and Australasia, making it difficult to draw comparisons with developing countries.

Relevant Anatomy

Anatomy of core consists of muscles, ligaments, and facial layers which assist in providing spinal stability necessary for activities of daily living. The muscles that are relevant to spinal stability can be grouped into local stabilizers and global stabilizers (Bergmark , 1989). The muscle includes **External Oblique**-This muscle lying on the side and front of the abdomen around the waist, helping to twist the torso. **Internal Oblique -** This muscle is lying beneath the external oblique, running in the opposite direction, and also acting in the twisting motion. **Rectus Abdominis**- It is a long muscle that extends along the abdomen, in the middle section of the torso, and helping to curl the trunk. **Erector Spinae**- It is a group of three muscles running along the spine and the rib cage, from the lower back to the neck, and acts when the back is in extension. **Transverse Abdominis**– It is the deepest lying muscle around the abdomen which acts like a corset, protecting the organs and stabilizing the spine during functional posture and movements (Richardson et al., 2002). **Multifidus** –This is the small muscle which lies along the spine with short fibers, connecting one vertebra to the other. **Iliopsoas** – This is a group of two muscles which originates from inside the pelvis and from the vertebrae column join, and together exert on the femur, taking an important part in hip flexion. **Quadratus Lumborum**–It is the string of muscles connects the pelvic crest to the ribs and to the vertebras in the lower back, helping the side movements of the trunk. It plays a significant role in stabilizing due to its orientation (Bergmark , 1989). **Pelvic floor muscles** – These are short and strong muscles, lying deep at the bottom of the pelvis. Its primary contribution to lumbar stability is through contraction with the abdominals to increase intra-abdominal pressure, thus creating an anatomical brace to decrease the load on spine (Kibler

et al., 2006). **Diaphragm –** It serves as the roof of the muscular box of core and increases the intra-abdominal pressure, thus provide spinal stability.

Causes

Low back pain may arise from any one of a number of anatomical structures, including bones, intervertebral discs, joints, ligaments, muscles, neural structures and blood vessels (Deyoand Weinstein, 2001). In a minority of instances, approximately 5–15%, low back pain can be attributed to a specific cause such as an osteoporotic fracture, neoplasm or infection (Deyo and Weinstein, 2001; Ehrlich, 2003; Hollingworth et al., 2002). For the remaining 85–95% of cases, the specific cause of low back pain is unclear (Deyo and Weinstein, 2001; Ehrlich, 2003).

It begins most commonly between the age of 20 and 40 years. Low back pain is common in women. Persons who are in sedentary jobs are more prone to back pain including surgeons, dentists, miners, truck drivers etc. Causes of low back pain mainly includes postural causes (e.g. Protuberant abdomen, Occupational bad posture, Habitual bad posture), traumatic causes (e.g. sprain, strain, vertebral fractures, prolapsed disc), congenital causes (e.g. spina bifida, spondylolisthesis), inflammatory causes (e.g. tuberculosis, ankylosing spondylitis), degenerative (e.g. osteoarthritis), and metabolic causes (e.g. osteoporosis, osteomalacia).

Different anatomical structures and pathophysiological functions can be responsible for lumbar pain, each producing a distinctive clinical profile. Pain cans arise from the intervertebral disc in which case, greatest pain provocation will be associated with movements and functions in the sagittal plane. Lumbar pain can also arise from afflictions within the zygapophyseal joint mechanism, which will produce the greatest pain provocation during three-dimensional movements, dueto maximal stress to either the synovium or joint Cartilage (Sizer et al., 2001).

Risk Factors

Risk factors of LBP are multi-factorial, and include physical factors, social demographic characteristics, habits and psychological factors. The risk factors for back pain reported in previous studies include heavy physical load, smoking (shiri et al., 2010), alcohol consumption (Ferreira et al., 2013) and obesity (Shiri et al., 2010). It has been postulated that obesity may cause back pain through mechanical load on the spine, systemic chronic inflammation, spine degeneration, or decreased blood flow to the spine due to atherosclerosis, while weight loss has been reported to lead to the resolution of back pain among the morbidly obese.

Some studies have reported that subjects who carry excessive abdominal fat mass over a long period may be at risk of low back pain, as a result of altered posture to counterbalance the protruding fat mass. It is also observed that height may relate independently to low back pain from large abdominal fat mass and may aggravate back pain associated with stooping especially in those with large waist or large abdominal fat mass (Hans et al., 1997).

Clinical Feature

Most common clinical feature is pain that prevents normal daily activities like standing to sitting, sitting to standing, bending, twisting, toilet activities, bathing, prolonged sitting or standing, stair climbing, squatting etc. Chronic pain may leads to psychological problems like depression, anger, mood swings, irritation etc. Both physical and psychological symptoms lead to poor quality of life in low back pain patients.

Conservative Treatment

Van Middelkoop et al., (2011) reviewed 83 studies (exercise therapy [37 studies], back school [5], TENS [6], Laser therapy [3], massage [3], behavioral treatment [21], patient education [1], traction [1] and multidisciplinary treatment [6 studies]) and recommended following physical treatment options for LBP. They defined the above treatment options as follows:

Exercise therapy was defined as ‘‘a series of specific movements with the aim of training or developing the body by a routine practice or physical training to promote good physical health’’ (Abenhaim et al., 2000).

A back school was defined as consisting of educational and skills acquisition program, including exercises, in which all lessons were given to groups of patients and supervised by a paramedical therapist or medical specialist (Heymans et al., 2005).

All standard modes of transcutaneous electrical nerve stimulation (TENS) were considered. TENS is a non-invasive therapeutic modality. TENS units stimulate peripheral nerves via skin surface electrodes at well-tolerated intensities and are capable of being self-administered (Khadikar et al., 2008).

Superficial heat or cold included all kinds of heat or cold therapies, such as ice, cold towels, cold gel packs, ice packs, and ice massage; hot water bottles, heated stones, soft heated packs filled with grain, poultices, hot towels, hot baths, saunas, steam, heat wraps, heat pads, electric heat pads, and infrared heat lamps (French et al.,2006).

Low-level laser therapy (LLLT) is a light source that generates pure light of a single wavelength with non-thermal effects (Baxter et al., 1991).

Patient education was defined as ‘‘a systematic experience, in a one-to-one situation, that consists of one or more methods, such as the provision of information and advice and behaviour modification techniques, which influence the way the patient experiences his illness and/or his knowledge and health behaviour, aimed at improving or maintaining or learning to cope with a condition’’ (Engers et al., 2008).

Massage was defined as soft tissue manipulation using the hands or a mechanical device (Furlan et al., 2002).

Behavioural treatments included operant, cognitive, and respondent treatments or a combination of these treatments. Each of these focuses on the modification of one of the three response systems that characterize emotional experiences: behaviour, cognition, and physiological reactivity (Henschke et al., 2010).

Lumbar supports included any type of lumbar support, flexible or rigid, used for the treatment of chronic nonspecific LBP (van Duijvenbodeet al., 2008).

The intervention traction included any type of traction, such as mechanical traction, manual traction (unspecific or segmental traction), computerized traction, auto traction, underwater traction, bed rest traction, inverted traction, continuous traction, and intermitted traction (Clarke et al., 2005).

Finally, the multidisciplinary treatment included multidisciplinary bio-psychosocial rehabilitation with minimally one physical dimension and one of the other dimensions (psychological or social or occupational) (Gujman et al., 2001).

Statement of Problem

LBP is the most common musculoskeletal pain leading to disability which causes great economic burden to the individual, organization as well as nation. The prevalence of LBP and its risk factors studies are mostly from developed nations both Western countries and Australia. The prevalence studies from developing countries, low and middle income countries like India are scarce which is well reported in literature. Most of the studies reported from in India are work related LBP than population based. Most recently published large population based article (SAGE) was recruited people aged 50 years or more which prevents its applicability to middle aged population.

Objectives

To find out over-all, age specific, gender specific prevalence of LBP in urban population of Haryana

To identify the personal, socio-economic, physical activity/fitness, sedentary behavior based correlates for LBP in this population.

Hypothesis

Based on the literature we hypothesized that

- Female will be more prone to LBP than males
- Low-socio economic class (low income, SC category, low education) will be affected by LBP
- Smoking, alcohol consumption will increase LBP prevalence
- High BMI (general obesity), waist circumference (truncal/abdominal obesity) will increase LBP

RESEARCH METHODOLOGY

Type of Study

Population based cross sectional survey study

Sample collection from population:

Population of this cohort was people living in urban area of Hisar city situated in Haryana state. Sample selected for this cohort was based on muti-stage random sampling technique. Sample size was calculated using online free software (*OpenEpi*) at 95% significant level, 80% power with ratio of 1:7 for exposed versus unexposed and OR of 2.00 which yielded 1844. 6 locations were selected with the sample size of 308 in each location to achieve our aims and objectives.

Hisar city has 20 wards and each ward was divided into 1-6 logistic locations where, student volunteers thought feasibility (near to University), response and compliance rates will be high. 6 wards were selected (Ward No 1, 5, 8, 14, 16 and 20) and one location from each ward was randomly selected by corresponding

author. Student volunteers randomly selected one house and invited the master of the house to participate in this cohort. If he agrees, all members above 30 years old were included in cohort after getting initial verbal consent from each followed by administration of a questionnaire and measurement of other outcome variables. Participants also provided their mobile number along with written willingness to join the cohort at the end of questionnaire. If master of the house not agree to participate, volunteers visited next house using left thumb rule until they reach desired sample size (i.e.) 308 from each location.

Primary variable (variable of interest)

Low back pain (both acute and chronic) in last 12 months

Variables

Age
Sex
BMI
Waist circumference
Community
Education
Income
Smoking
Alcohol consumption
Ghee use
Household activities (ADL)
Muscular strength
Sitting time
TV watching time
Sleeping time
Blood pressure (Hypertension)
Fasting blood glucose (Diabetes)

Questionnaire:

Pre-designed questionnaire (in English), modified from pilot study done in 2015, and was administered to the individual participants and therapist assisted if there was a problem to read/understand. Following parameters were self-reported: age, height, weight, community, education, income, smoking, alcohol habits, food habit, ghee use, ADL activity, TV watching time, sitting time, sleeping time. The following parameters were measured in the questionnaire: BMI, waist circumference, blood pressure, fasting blood glucose, hand-grip strength.

Measurement of primary variable:

LBP is defined by temporality- 12 month recall and episode duration (at least 3 days). Self-reported LBP was defined as pain lasting more than a day in an area between the lower costal margin and the gluteal folds with or without radiation into leg during past one year (Hans et al., 1997). The person should either

contact health care professionals for pain or reduce/modify his ADL to adjust pain. Modified Nordic musculoskeletal questionnaire (only middle 2 sections) with diagram used by de Barros and Alexandre (2003), was used for this purpose.

Measurement of variables:

Following correlate variables were self-reported: Age (classified in to 30-39 years, 40-49 years, 50-59 years, 60 years or more- 4 categories), community (general, BC, SC- 3 categories), education (classified into illiterate, school- up to metric, school- metric or post-metric, college/university- 4 categories), income as on summer 2015 (in Rs per month) (quartile- 4 categories), smoking (yes/no- 2 categories), alcohol habits (yes/no- 2 categories), ghee use (no and <1 spoon/day, >1 spoon/day- 2 categories), house-hold activities (ADL) (sex stratified quartile- 4 categories), sitting time (sex stratified quartile- 4 categories), TV watching time (quartile- 4 categories), sleeping time (quartile- 4 categories).

Blood pressure was measured using automatic digital sphygmomanometer [OMRON®, Binh Duong, Vietnam] which is operated by batteries. Subject was asked to sit without support in relaxed manner while keeping hands in knees, elbow in extension and forearm supination. Cuff was fit into the left arm, while the tube connected to the instrument kept above the brachial artery. Apparatus always kept at heart level and the body of apparatus has 'start' button which has to be pressed before reading. This results automatic inflation of cuff to the level above the SBP, then deflated; at the end it shows SBP, DBP, pulse rate (HR) values. The same procedure was repeated thrice and the middle value was recorded with both higher and lower values removed. Persons with systolic blood pressure (SBP) 130 mmHg or more and diastolic blood pressure (DBP) 85 mmHg or more along with uncontrolled self-reported hypertension were classified as hypertension.

Fasting blood glucose (FBG) was measured by hand-held portable glucometer [ACCU-CHECK Active, Mannheim, Germany]. After sterilizing the subject's ring finger using spirit swab, it was pricked using sterile softclix lancets. Initial oozing blood was wiped out, and then one drop blood was taken by sensor side of gluco-strips. After approximately 5 seconds, display section shows blood glucose level in $mg.dL^{-1}$. The whole procedure was repeated if only extreme values comes (<60 $mg.dL^{-1}$ or >200 $mg.dL^{-1}$ without self-reported diabetes) and higher reading in lower values, lower readings in higher values were recorded. FBG greater than 100 $mg.dL^{-1}$ but less than 125 $mg.dL^{-1}$ were classified as pre-diabetes. FBG greater than 125 $mg.dL^{-1}$ or self-reported diabetes were classified as diabetes.

Waist circumference (WC) was measured using non-elastic inch tape in early morning after bladder and bowel emptying. Subject was asked to stand with minimal and loose clothing. Measurement site was decided by mid-way between 12th rib and ASIS (anterior superior iliac spine). Measurement was recorded in the assessment form, questionnaire, to the nearest centimeter (cm) value. WC greater than 80-89 cm for females; 90-99 cm for males were classified as Asia specific truncal obesity and 90 cm or more for females; 100 cm or more for males classified as truncal obesity.

BMI was calculated from self-reported values of weight in Kilogram and height in meters. The formula used was Weight divided by height^2. BMI < 25 Kg.m^{-2}, 25-29.99 Kg.m^{-2}, 30 Kg.m^{-2} or more were classified as normal, overweight and obesity respectively.

Hand-grip strength (HGS) was measured using Jamar digital hand-held hydrolic hand dynamometer [Jamar® Plus+, Sammons Preston, and Bolingbrook, IL]. HGS measurement was measured in sitting position for both right and left side. Each subject was asked to maintain the desired upper limb position (shoulder adducted, 0º flexion; elbow in 90º flexion; forearm mid-pronation), which was physically demonstrated by the therapist, and asked to press as hard as possible for 5 seconds (command given was press...one...two...three...four...five...relax). The procedure was repeated three and average of three was recorded in the assessment form as Kg. Sex stratified quartile (4 categeries) was used for analysis.

Statistics

After presenting the mean along with standard deviations (SD) for basic characteristics of sample; over-all, sex and age stratified prevalence of LBP was calculated in percentage. Chi-square test using cross-tabulation was used to see the association between variables and knee pain (continuous variables were quartiled for this purpose). If there was a significance in chi-square test variables were entered in to binary logitic regression individually as well as combination and best model was used for the presentation. All the analysis were done in IBM-SPSS (version 21.0).

IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

Overall, 2133 subjects were invited to participate and 1540 agreed (response rate- 72.20%). After removal of 37 subjects during validation phase, data of 1503 subjects (female 814- 54.2%) were used in this study. The basic characteristics (mean±SD) of age, height, weight, BMI were 48.23±13.12 yrs, 161.68±8.46 cm, 67.96±12.42 Kg, 25.97±4.57 Kg.m^{-2} respectively.

Table 4.1: Mean, standard deviation (SD), quartile values for some selected variables

SNo	Correlate	Mean±SD	25%	50%	75%
1	Age	48.22±13.12	37.00	47.00	58.00
2	BMI	25.97±4.57	23.15	25.66	28.40
3	Waist circumference	92.44±14.37	86.00	92.00	101.00
4	Monthly income	33102.06±21546.97	20000	30000	40000
5	House-hold ADL Male Female	7.57±9.02 31.11±14.04	2.33 21.00	4.00 35.00	10.50 42.00
6	Right HGS Male Female	34.74±8.85 22.26±6.83	29.28 18.00	35.70 22.20	40.20 26.13
7	Left HGS Male Female	32.71±9.01 20.75±7.00	27.28 16.45	33.40 20.30	39.10 25.10
8	Sitting time Male Female	32.77±9.01 28.07±13.10	25.00 21.00	35.00 28.00	42.00 35.00
9	TV watching time	10.38±16.14	4.00	7.00	14.00
10	Sleeping time	52.84±9.66	49.00	52.50	56.00

House-hold ADLs, monthly income, hand-grip strength (HGS), sitting time, sleeping time were quartile (4 categories) for the analysis. During data validation, there was a significant sex difference in house-hold ADL; sitting time and HGS values hence quartiles of these variables were sex-stratified for final analysis (Table 1).

Table 1 shows mean along with standard deviation (SD), quartile values for following variables age (years), BMI ($Kg.m^{-2}$), waist circumference (WC) (cm), monthly income (rupees), house-hold ADLs (hours/week), HGS for right and left side (Kg), sitting time (hours/week), TV watching time (hours/week), sleeping time (hours/week).

Table 2 shows prevalence rate of LBP according to variables along with missing values. One year prevalence of LBP was 19.0%. Females (23.0%) were more complained than males (14.2%). It increased as waist circumference increases. Illiterates and matric/post-matric had more prevalence than university/college educated. SC (25.0%) had more LBP than general or BC. Alcohol consumption and ghee consumption decreased the LBP prevalence. Smoking and low income increased the LBP. Long TV watching, long sleeping duration and long sitting time increased the one year LBP prevalence. Diabetes increased the LBP prevalence whereas hypertension decreased.

Table 2: One year LBP prevalence rate according to subcategories of selected variables along with missing values in urban population

S No.	Variables (correlates)	Missing values (n)	Sub-category (n)	Prevalence rate (%)
1	Age	10	30-39 years (452) 40-49 years (358) 50-59 years (331) 60 years or more (352)	16.20 21.50 18.10 20.70
2	Sex (19.0%)	00	Males (689) Females (814)	14.20 23.00
3	BMI	09	Up to 24.99 $Kg.m^{-2}$ (683) 25-29.99 $Kg.m^{-2}$(241) 30 $Kg.m^{-2}$or more (570)	19.20 21.20 17.90
4	Waist Circumference	14	WC <80 cm (F); <90 cm (M) (358) WC 80-89 cm (F); 90-99 cm M) (483) WC ≥90 cm (F); ≥100 cm (M)(648)	19.30 14.90 21.90
5	Community	26	General (OC) (992) Backward (BC) (392) Scheduled (SC) (93)	18.50 19.10 25.00
6	Education	19	College/ University (635) Matric or Post-matric (541) School below matric (142) Illiterate (166)	12.90 23.10 21.10 27.10
7	Income	30	1st quartile (lowest) (514) 2nd quartile (345) 3rd quartile (271) 4th quartile (highest) (343)	21.40 15.90 18.10 19.20
8	Smoking	00	Yes (smokers) (148) No (non-smokers) (1355)	22.30 18.60
9	Alcohol consumption	00	Yes (drinkers) (139) No (non-drinkers) (1364)	15.80 19.30

10	Ghee	00	Yes (1 or more spoons per day) (863) No (640)	17.30 21.30
11	Household ADLs	67	1st quartile (lowest) (392) 2nd quartile (497) 3rd quartile (275) 4th quartile (highest) (272)	19.90 17.50 20.70 19.50
12	Right HGS	07	1st quartile (lowest) (376) 2nd quartile (375) 3rd quartile (381) 4th quartile (highest) (364)	17.30 21.30 18.60 18.40
13	Left HGS	05	1st quartile (lowest) (374) 2nd quartile (386) 3rd quartile (368) 4th quartile (highest) (370)	19.30 18.40 20.40 17.80
14	Sitting time	24	1st quartile (lowest) (493) 2nd quartile (440) 3rd quartile (268) 4th quartile (highest) (278)	17.00 20.20 17.90 20.90
15	TV Watching	05	1st quartile (lowest) (385) 2nd quartile (505) 3rd quartile (386) 4th quartile (highest) (222)	19.00 20.00 16.60 21.20
16	Sleeping Time	21	1st quartile (lowest) (710) 2nd quartile (473) 3rd quartile 4th quartile (highest) (299)	18.20 18.00 - 22.70
17	Hypertension	00	No (normal BP) (874) Yes (hypertensive's) (629)	19.90 17.60
18	Diabetes	12	No (normal) (913) Yes (Pre-diabetic) (334) Yes(Diabetic)(244)	16.80 22.80 20.50

Table 3: Association between LBP and 18 selected variables in urban population

S No.	Variables (correlates)	df	Chi-Square (x^2) value	Significant ('p') value
1	Age	3	4.710	0.194
2	Sex	1	18.590	0.000
3	BMI	2	1.198	0.549
4	Waist Circumference	2	8.848	0.012
5	Community	2	2.892	0.235
6	Education	3	28.716	0.000
7	Income	3	4.181	0.243
8	Smoking	1	1.188	0.276
9	Alcohol consumption	1	0.979	0.322
10	Ghee	1	3.797	0.051
11	Household ADLs	3	1.472	0.689
12	Right Hand Grip Strength	3	2.160	0.540
13	Left Hand Grip Strength	3	0.888	0.828
14	Sitting time	3	2.493	0.477
15	TV Watching	3	2.474	0.480
16	Sleeping Time	2	3.361	0.186
17	Hypertension	1	1.217	0.270
18	Diabetes	2	6.388	0.041

Table 3 shows association between 18 variables and one year LBP in urban population using chi-square test (x^2). Sex and education (2 variables) were very highly associated with LBP with significant

p<0.001. Waist circumference, ghee use and diabetes (3 variables) were the next significant variables associated with LBP (p<0.05). Other 13 variables were not associated with LBP with p>0.05.

Table 4: Odd ratio (OR) along with 95% confidence interval (95% CI) using univariate binary logistic regression for selected variables

S No.	Variable	Sub category	OR (95% CI)	R^2	Correctness
1	Sex	Males Females	Ref. 1.80 (1.37-2.35)	0.013	81.0 %
2	Waist Circumference	WC <90 cm (F); <100 cm (M) WC ≥90 cm (F); ≥100 cm (M)	Ref. 1.39 (1.08-1.81)	0.004	81.0%
3	Education	College/ University Matric or Post-matric School below matric Illiterate	Ref. 2.03 (1.49-2.75) 1.81 (1.14-2.88) 2.51 (1.66-3.79)	0.020	81.0%
4	Ghee use	Yes (1 or more spoons per day) No	Ref. 1.29 (1.00-1.68)	0.003	81.0%
5	Diabetes	No Yes (Pre-diabetic) Diabetic	Ref. 1.46 (1.07-1.99) 1.28 (0.90-1.83)	0.004	81.3%

Table 4 shows OR along with 95% CI for 5 variables using univariate binary logistic regression which were significant in chi-square test. Sex and education explained more than 1.0% of the variability in study population. Female sex increased 80% more LBP prevalence compared to males. Illiterates were 150% more LBP prevalent compared to college or university educated whereas matric/post-matric doubled the chances. No ghee use or less than 1 spoon ghee use per day increased the LBP prevalence by 29%. Being pre-diabetic increased the LBP prevalence by 46% compared to normal FBG.

Based on the results in Table 2, we performed separate analysis for 6 variables and the results showed scheduled caste (SC) category (OR 1.51; 95% CI 0.93-2.45), smoking (OR 1.26; 95% CI 0.83-1.89), long sitting time (upper quartile) (OR 1.17; 95% CI 0.85-1.62), longer TV watching (>2 hours/day) (OR 1.17; 95% CI 0.82-1.66), longer sleeping time (>8 hours/day) (OR 1.33; 95% CI 0.98-1.81), low income (<20000 per month) (OR 1.26; 95% CI 0.97-1.65) were significantly increased the one year self-reported LBP prevalence.

Table 5 shows adjusted OR along with 95% CI when all 5 significant variables were entered into binary logistic regression (multivariate). Backward stepwise conditional method with constant was used for presentation which involved 3 steps. Truncal obesity (step 1), ghee use (step 2) were removed from the model before including sex, education, diabetes in final model. Female sex, illiterate, matric/post-matric, pre-diabetes were significantly increased the odds of LBP prevalence.

Table 5: Adjusted odd ratio (OR) along with 95% confidence interval (95% CI) using multivariate binary logistic regression for selected variables

S No.	Variable	Sub-category	OR (95% CI)	Significant
1	Sex	Females Males	1.60 (1.20-2.13) Ref.	0.002
2	Waist Circumference	Truncal obesity	1.12	0.434
3	Education	University/College Matric/Post-matric School (below matric) Illiterate	Ref. 1.88 (1.37-2.57) 1.55 (0.96-2.50) 1.95 (1.26-3.03)	0.001 0.000 0.097 0.003
4	Ghee Use	No	1.13	0.379

5	Diabetes	Normal Prediabetes Diabetes	Ref. 1.42 (1.03-1.95) 1.26 (0.87-1.82)	0.079 0.031 0.215

Model: Backward stepwise conditional method with constant (R^2 0.030). OR along with 'p' values for non-significant variables were before they removed from model; total 3 steps (WC removed in step 1; ghee use removed in step 2; remaining 3 variables kept in final model).

DISCUSSION

Overall one year prevalence of self-reported LBP is 19.0% in Hisar urban population. Female sex, truncal obesity (WC 100 cm or more in males; 90 cm or more in females), lack of education and low education, lack of ghee use (no or less than 1 spoon per day), elevated FBG are the significant risk factors for LBP prevalence. After adjusting covariates female sex, lack of and low education, pre-diabetes (FBG greater than 100 $mg.dL^{-1}$ but less than 125 $mg.dL^{-1}$) remained the correlates for one year self-reported LBP prevalence.

Present study results like female gender, smoking, low education, low income, waist circumference as risk factors for LBP is supported by 2 recent Indian studies with large sample size (i.e.) more than 6000 aged 50 years or more (Williams et al., 2015; Koyanagi et al., 2015).

Female sex increases the one year LBP prevalence by 60-80% (adjusted OR 1.60; 95% CI 1.20-2.13). This is supported by both Indian (Williams et al., 2015; Koyanagi et al., 2015; Bindra et al., 2015) as well as western studies (Heistaro et al., 1998; Bener et al., 2014).

Low education either illiterate (adjusted OR 1.95; 95% 1.26-3.03) or schooling (adjustedOR 1.88; 95% CI 1.37-2.57) increases the LBP risk as compared to college/university education. This is supported by Heistaro et al., 1998; Mathew et al., (2013) (OR 1.89); Williams et al., (2015) (OR 2.00); Koyanagi et al., (2015) (OR 1.79). Dionne et al., (2001) systematically reviewed 64 articles and found there was a stronger association of low education with LBP prevalence. They explained the possible mechanisms for this association as behavioral and environmental risk factors by education, differences in occupational factors, differences in access to and utilization of health services and adaptation to stress.

Truncal obesity (waist circumference) (OR 1.39; 95% CI 1.08-1.81) increases the LBP prevalence risk which is supported by 2 Indian studies (Williams et al., 2015 [OR 1.10]; Mathew et al., 2013 [OR 1.26 for men; 1.08 for women]). The possible mechanism for LBP may be increased waist circumference will lead to lumbar lordosis and abdominal weakness which predispose the individual to pain perception in low back.

Smoking (OR 1.26; 95% CI 0.83-1.89) increases the LBP risk albeit lack of significance. This is supported by following Indian articles: Williams et al., (2015) (OR 1.20); Koyanagi et al., (2015) (OR 1.18); Mathew et al., (2013) (OR 1.02). Last two articles also reported lack of significance for smoking. Shiri et al., (2010) conducted a meta-analysis to see the association between smoking and LBP. Their results showed one year prevalence of LBP was associated with smoking (pooled OR 1.33; 95% CI 1.26-1.41). They explained impaired fibrinolysis, lack of nutrition into intervertebral discs, production of osteoporosis and increased mechanical stress to spine by coughing as possible mechanisms for LBP in smokers.

Low income (OR 1.26; 95% CI 0.97-1.65) increase the LBP risk. This is supported by Williams et al., (2015) (OR 1.40) and Heistaro et al., (1998). Similar to Bener et al., (2014) (OR 2.13) findings long sitting time (OR 1.17; 95% CI 0.85-1.62) increase the risk of LBP. Low socio-economic class (SC) has higher risk (OR 1.51; 95% CI 0.93-2.45) for LBP which is supported by Mathew et al., (2013).

CONCLUSION

The present study can be concluded with following points:

- One-year self-reported LBP prevalence is 19.0% in Hisar urban population
- Female sex, high waist circumference, low education, lack or reduced of ghee use, high FBG are identified as risk factors for developing LBP in urban population.
- After adjustment female sex, truncal obesity, lack of education, school education, pre-diabetes are significant correlates for LBP

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