Original Article

Effect of physical exercise and routine intervals on LBP assessment using VAS, OLBDPQ, and RMQ among professional motorbike riders in Dhaka city

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Abstract:

Low back pain (LBP) issues have become very acute in the health status of Dhaka City motorbike riders. As per the ergonomic study, a routine interval and therapeutic exercise especially stretching exercise has a surprising outcome that's why a study was conducted with motorbike riders in Dhaka City. Three established parameters were used for the assessment of LBP. This research conducted aiming to assess the significance of stretching exercises and routine-intervals upon severe low back pain sufferers among the professional motorbike riders. A "quasi-experimental interventional study" conducted with some specific criteria and a 12 week summary represented by the three times assessment, where 70 participants were included among the professional motorbike riders from Dhaka City. Two groups were divided by equal number participants where either group-candidate was prescribed complete guidance to perform in conditional intervals. Those three assessments were accessed considering parameters namely visual analog scale (VAS), Oswestry low back pain disability questionnaire (OLBDPQ), and Roland Morris questionnaire (RMQ). The results of this study reflect the significant analysis between stretching exercises, routine-intervals and body mass index (BMI) with LBP. According to VAS, 5.7% of patients totally cured of LBP and most of the participant represents a highly successful progression with VAS, OLBDPQ and RMQ perimeter. In contrast, the recovery of low back pain was too slow for obese patients. The research suggested that every motorbike riders should perform stretching exercises regularly and maintain a routinized interval into the daily working schedule. The study also strongly refers to maintain BMI to prevent LBP progression.

Keyword: Low back pain, body mass index, VAS, OLBDPQ, RMQ, exercise.

Introduction:

Low back pain (LBP) is one of the most commonly encountered medical applications in the present era and arises as a clear global public health issue in all kinds of economical country. 54% of LBP progression has notified from the year between 1990 and 2015 globally (Hartvigsen et al., 2018). LBP is a symptom, not a disease, can persist by different kinds of abnormalities or disorders. It can be aggravated by the interrelated abnormalities between spinal muscles, nerves, bones, discs, or tendons in the lumbar spine and it is impossible to determine as a specific nociceptive cause. It is commonly affected by professional personnel such as driver, computer engineer, dentist, nurse, academic staff and occupation that persist a lot of improper body posture and movements (Tamrin et al., 2007). Development of LBP due to prolong sitting and vehicle vibration, professional drivers are at risk. LBP has been reported the most extensively by drivers among different types of musculoskeletal disorders (Alperovitch-najenson et al. 2010).

Lower back pain can occur or develop by many kinds of factors like age, gender, height, weight, body mass index (BMI) and general health. Factor also involve like ergonomic factor, work-related factor and psychological factor (Alperovitch-najenson et al. 2010). The risk of personal injury of motorbike riders is more vulnerable than car drivers. In the study of Nigeria, 41% of LBP has accessed commercial motorbike riders (Ogundele et al., 2017). Motorbike riders have reported a variety of hazards including fatigue, physical disturbance due to motion, noise, vibration and pollutions from other vehicles. Long-distance riding on poor and bumpy roads results in prolong stress, restriction to a fixed position, psychological discomfort due to feelings of direct or indirect risk can lead ultimately to accident, injury, or health (Jaiyesinmi et al., 2018). Over workload can lead to musculoskeletal pain also provoke LBP for both professionals and non-professionals (Rashaduzzaman et al., 2019).

There are two main types of treatment protocols used for the cure of LBP one surgical and two is non-surgical. Non-surgical treatment also uses several techniques like drugs, physiotherapy, yoga, acupuncture and many other traditional techniques like specific dieting based approaches. In recent times different probiotics are suggested in pain-relieving (Roman et al., 2018) to the patients through the regular consumption of milk-derived

food products (Abdullah-Al-Mamun et al., 2016) in their diet chart. Even a few of the bacterial strains have found effective against inflammation and allergic reaction in the “*in vivo*” animal model (Al Azad et al., 2020). In the field of physiotherapy and rehabilitation, strength or resistance, coordination or stabilization exercise (Searle et al., 2015), endurance exercise (Sitthipornvorakul et al., 2015), stretching exercise and occupational modification like rest break or interval between rides are playing an effective progression role for LBP (Ghasemi et al., 2018). Professionals are maintained a long time in a single position or same posture in a day. In that case, proper posture, timely postural change and taking rest breaks or intervals are highly effective to reduce LBP, discomfort as well as enhance the productivity of the work also (Waongenngarm et al., 2018). Hazard free physical status can provide the best support and progression into work or professional life and normal life also.

Decoration of office instruments like back supported chair, table, and computer height label as well as vibration absorber seat or rubber bumper, back support for vehicle drivers has played a big role to prevent LBP. Proper designing of exercise therapy can be the most effective way to reduce LBP of motorbike riders. Treatment may include counseling, educate proper positioning, and introduce proper orthotics for the individual. Prevention of interference with daily activities is most effective for the treatment of MSP (Suka and Yoshida., 2009).

Observing all the aforementioned facts, this study aimed to assess the importance of stretching exercises and rest-breaks upon severe low back pain sufferers among professional motorbike riders.

Materials and Methods

Participants:

This is a quasi-experimental interventional study. This study was conducted to measure the importance of stretching exercises and rest breaks or taking interval times during the working period who suffers LBP among Bangladeshi motorbike riders from December 2018 to February 2019. In primary selection, the study population was 102 male motorbike riders who had chronic LBP. After that, based on inclusion criteria, 22 subjects were eliminated and 10 subjects refuse to participate. 70 subjects participated in our final study and between them. Two Groups were formed containing 35 subjects in each (Group A “Stretching exercise” & Group B “Reference”). Jessore Medical College Human Research Ethics Committee provided ethical approval for this research to carry out in accordance with the Declaration of Helsinki: Recommendations Guiding Physicians in Biomedical Research Involving Human Subjects. The inclusion criteria were (a) age between 25 and 45 years, (b) chronic LBP suffers at least 12 months, (c) experience of professional bike riding for at least 6 years, (d) willingly share pain-related information by telephone and physical presence for 3 months, (e) BMI between 25.0 to 29.0 and (f) signing informed consent. The exclusion criteria were the history of (a) trauma, (b) present or history of lumbar discographies, (c) rheumatologic disorders, (d) congenital disorder, (e) psychological illnesses, (e) long-term systemic corticosteroid administration, (f) systemic disorders of any kind and/or, (g) drug-addiction. Drivers in Bangladesh have to submit a medical certificate to take license in BRTA to provide the approval to drive; the elimination criteria were easily extracted. Low back pain is a symptom, not a disease, can persist by different kinds of abnormalities or disorders. The location can be measured from the lower rib margins and the buttock creases (9 subjects). A physician can extract LBP by clinical assessment properly.

Protocol:

The severity of LBP measured by the oral declaration of subjects and rated by colored 10 cm visual analog scale (VAS). Severity range was 0 to 10 cm and motorbike riders were asked to make a mark their pain into VAS. Roland morris questionnaire (RMQ) and the Oswestry low back pain disability questionnaire (OLBPDQ) were select as a standard to find out the rate of disability (Mousavi et al., 2006). Total scores of OLBPDQ ranged 0-50 with the higher values shows that the severity of disability which consists of 10 items and each of them scaled from 0-5 (Fairbank et al., 1980). In contrast, the total score of RMQ is 0-24 with the higher values represents more severity. 102 motorbike riders were participated to complete blinding chart among them 70 riders met with the inclusion criteria. After signing the informed consent, riders were divided into two groups containing 35 riders each Group. Between them, Group A preferred rest breaks and stretching exercise programs and Group B was considered to reference. Groups were divided by the blind randomization process with the participant’s unique code and preferred to full fill the questioner and pain rating scale. Group A members were meet with physiotherapist face to face one by one and take counseling about the importance of stretching exercises and rest breaks after that a printed typed guideline was provided to maintain proper sleeping, carriage proper load, proper driving, and ergonomic sitting, how they should take rest breaks and how long also the proper guideline about stretching exercises. Group B members also meet with physiotherapist the same procedure and take counseling about the seriousness of rest breaks, exercises and the proper positioning of sleeping, load carriage, proper driving, and ergonomic sitting but between Group B printed guideline did not provide.

Interventions:

Two different packages of exercises were designed for Group A subjects between them one for home and one for travel time (interval of a ride). For home 2 times, one for morning and one for the night. Those home exercises requested to performed in lying position, plank exercise for 15 seconds 5-second interval 3 repetitions

after that back extension exercise for 5-second hold 5-second interval 5 times repetition and at last bridging exercise 2 second hold 5-second interval 5 times. Exercise for the interval time during travel was requested to perform slow lumbar flexion and slow lumbar extension for at least 30 seconds (Shirado et al., 2005). A set contained five repetitions. The first exercise was performed by the observation of physiotherapist after that all subjects were visited after 4 weeks of interval and other sessions of exercises were self-performed between riding intervals and at home. Subjects of Group A should take 40 to 60 minutes rest during 8 hour work time which divided 3-4 breaks/intervals. Compliance with the interventions was monitored by a self-designed diagram. Subjects who did not perform or discontinue the requested protocols were disqualified from the main steam of the study.

Statistical Analysis:

All the data collected from the questionnaire were statistically analyzed using SPSS 22.0 and GraphPad Prism 8.0 to figure out the significant values among different variables. Finally, the graphical presentation of the data was included to describe the most to least significant values regarding LBP occurrence.

Result

Assessment from Visual Analog Scale (VAS):

In this study, Group A and Group B have 35 LBP sufferers equally, where (Figure 1a) represents that 45.7% and 25.7% persist into baseline assessment (BLA) at the range of 7 and 8, assessed by VAS. After 6 weeks of middle assessment (MA) performance, successful progressions were observed at 37.1% and 40.0% to the respective participants persisted at the range of 4 and 5 into VAS. A tremendous outcome was observed in the final assessment (FA), where 5.7% of patients totally cured and 22.9% and 42.9% of participants were belonging to the 1 and 2 parameters according to VAS during the research activity.

Notes: BLA (Baseline Assessment); MA (Middle Assessment); FA (Final Assessment). Two-way ANOVA reveals- p value is <0.0001 in all the two groups including three different parameters (in scale of significance of $p < 0.05$)

Fig. 1: Illustration of different LBP parameters considering three different assessment levels

On the other hand, Group B did not indicate any fluctuation between the parameters and progression. The result of the current study explores that a standard interval time and stretching exercises are highly effective in the case of LBP progression. On the other hand, the reference did not show any noticeable fluctuation in the parameters. Effectiveness or successful impact has successfully observed. Significant results found after BLA, MA and FA by the scale of VAS.

Assessment from Oswestry Low Back Pain Disability Questionnaire (OLBPDQ):

Firstly, most of the participants of Group A (Figure 1b) were belonging to the range at 35 to 40 into OLBPDQ on BLA. The range between 19 and 25 was assessed after passing 6 weeks on MA and the FA ranged between 13 and 16 notified by the factor of OLBPDQ. Secondly, no phenomenal fluctuation was observed among Group B (Figure 1b).

Assessment from Roland Morris Questionnaire (RMQ):

According to the RMQ parameter participants of Group A, (Figure 1c) stayed to the range from 12 to 20 in BLA. The progressions were assessed in MA, where 22.9%, 20.0%, and 22.9% participants stated at the range from 17, 18 and 20, respectively by the parameter of RMQ. In addition, the MA found relatively lower relativity than the BLA, but in the FA, a large number of participants were detected in 2, 3, 4 and 5 parameters, while the proportions were respectively 11.4%, 20.0%, 40.0%, and 17.1%. Surprisingly, Group B (Figure 1c) did not provide any important notification as compared to Group A.

Table 1. The socio-demographic report on LBP regarding different factors

Personal, demographic and occupational variable	Total (N = 70)	Rest breaks and stretching (n = 35)	Reference (n = 35)	p
Age (year)	33.97±5.161	33.97±5.199	33.97±5.199	0.998159
Body mass index	26.99±0.869	26.78±0.89	27.21±0.79	0.995626
Years in professional driving (year)	10.17±3.16	10.17±3.18	10.17±3.18	0.999099
Time of daily driving (h)	7.26±1.21	7.26±1.221	7.26±1.221	0.999216
Education level				
Diploma and less	52 (74.3%)	22 (62.9%)	29 (82.9%)	0.992491
Graduation and more	18 (25.7%)	13 (37.1%)	6 (17.1%)	
Regular exercise				
Yes	14 (20.0%)	10 (28.6%)	4 (11.4%)	0.995823
No	56(80.0%)	25 (71.4%)	31 (86.6%)	
Smoking habit				
Yes	50 (71.4%)	17 (48.6%)	33 (94.3%)	0.988075
No	20 (28.6%)	18 (51.4%)	2 (5.7%)	

In this research, 70 participants were met with the inclusion criteria and with a mean $\pm$ SD (age 33.97±5.161) years were participated. In this report, BMI, professional driving experience and a daily driving period followed by mean $\pm$ SD 26.99±0.869, 10.17±3.16 years and 7.26±1.21 hours (Table 1). The research did not show any significant difference between the two groups. This study reflects the major group of participants (80%), did not perform regular exercise and on the other hand, the rest performed exercise occasionally. In the segmented view, Group A reported more regular exercise habits than Group B. Besides, the majority of smoking habit shows Group B (N=33) than Group A (N=17).

According to VAS, this experiment revealed that recovery from LBP was 100% to the participants with BMI 25. Similarly, 96% recovery was obtained to the participants having BMI 26 (Table 2). In contrast, 46.4% and 44.4% of recovery were found from the participants at the BMI level of 27 and 28 respectively, which directly implies the impact of BMI towards the frequency of LBP recovery.

Table 2. BMI scale consequences on three different LBP measurement parameters

BMI	VAS			OLBPDQ				RMQ				
	0-4	5-7	8-10	10-20	21-30	31-40	41-50	1-5	6-10	11-15	16-20	21-24
25	8	0	0	8	0	0	0	6	2	0	0	0
26	24	1	0	19	6	0	0	14	5	6	0	0
27	13	15	0	11	6	11	0	9	3	14	2	0
28	4	5	0	3	2	4	0	2	2	2	3	0

Notes: After conducting 12 weeks of the experiment, only the final assessment were included in the table and presented in (%) to the description

OLBPDQ parameters refer that, all participants with BMI 25 experienced complete healing from LBP. 76% recovery was observed from the individuals possessing BMI 26. Phenomenally, 39.3% and 33.3% of participants progressed from BMI 27 and 28, respectively.

Discussion

Assessment from Visual Analog Scale (VAS):

Van Hoof, et al. (2018); Yang, et al. (2017), Akeda, et al. (2017) and Many others conducted VAS for the assessment of back pain, disco-genic LBP, chronic LBP, and occupational back pain as a standard on their studies. Resistance exercise, coordination exercise (Searle et al., 2015), aerobic exercise (Meng and Yue, 2015)

and stretching exercises have played as a well therapeutic intervention for reducing or recovering LBP. These analyses are totally relevant to our findings and assured by VAS.

Assessment from Oswestry Low Back Pain Disability Questionnaire (OLBPDQ):

Musculoskeletal disorders and musculoskeletal pain is most common on commercial drivers and LBP is one of them. OLBPDQ is a verified Italian low back pain assessment scale where one can explain his / her LBP from 1 to 50 mentioned by Donzelli et.al.(2006). In our study, we have noticed tremendous progress by the OLBPDQ score. Chronic lower back pain and non-specific low back pain were assessed by Batool et.al.(2019) and Ahmed et.al.(2017) respectively, using the OLBPDQ method on their study which provides a piece of authentic information that is relevant to my findings. OLBPDQ also provides a significant statement for the progression or reducing LBP between Group A and Group B.

Assessment from Roland Morris Questionnaire (RMQ):

Jaiyesinmi et al.(2018) found long-time driving, bumpy roads, and continuous vibrations enhance the possibilities of road traffic accidents. Most of the drivers have a high prevalence of LBP. Selective physical exercise and rest breaks can avoid surgical interventions for LBP sufferers and also enhance the productivity of work, which agrees with the research commenced by Sitthipornvorakul et.al.(2015). The analysis of this study has clearly addressed the progression of LBP on Group A by the RMQ scale. RMQ is a renowned parameter to detect the severity of LBP, directly follows to the Searle et.al.(2015) research. According to the RMQ parameter, the highly significant progress has notified of our study.

The research represents a transparent relationship between working time and LBP because of overuse, which is directly reflected with the results of Marsden(2010). Besides, Savage et al. (1997) research revealed that aged people suffer a high prevalence of LBP than the young aged, and it's exactly similar to the findings we made in this research. Overuse and/or, work-load is the most relevant factor for LBP for many kinds of occupations especially between the drivers in the age group of 31.3 (SD±4.5) years Ogundele et al. (2017) which is directly similar to this study. This research shows that a low prevalence of regular exercise but regular exercise helps to reduce and control LBP, mentioning Searle et al. (2015) works.

The factor RMQ reflects, 75% of participants were recovered from LBP with a BMI of 25. At the same time, 56% of participants successfully overcome LBP at the BMI of 26, while 32.1% and 22.2 % achieved from their respective BMI at 27 and 28. Kitaoka et.al. (2016) observed in his study that, chronic pain has a strong relationship with BMI. Higher BMI has a significant impact on LBP and developing a big risk factor for older people Muthuri et.al.(2017) on his study and data was taken from MRC National Survey of Health and Development which is directly similar to my findings. Dario et.al. (2015) showed a piece of noticeable evidence on obesity and LBP also represents a major clinical reason, this information also obeys with these research findings. To detect LBP among commercial drivers, BMI screening has a frequent impact on These et.al.(2015). Overweight people can gradually be affected by LBP and professional bike riders also to the main group of the occupational sufferer.

Besides MSP, basic physiotherapy drills and physical exercise has been reported to render benefits to the cardiovascular-disease-patients activating C-reactive protein (CRP) which is a type of opsonin (Semple, 2006). Opsonin molecules are responsible for inducing secondary immune response which is mainly complements and antibodies. Among many phagocytosis initiation precursors for cardiovascular patients, opsonin binding on the pathogenic surface is a fundamental one (Al Azad et al., 2016), which can be modulated by physical exercise.

Conclusion

This study represents that stretching exercises and taking rest breaks or interval for professional motorbike riders has a significant progressive outcome from LBP which confirmed by VAS, OLBPDQ and RMQ perimeter. BMI also shows a strong relationship with recovery from LBP. Comparatively, overweight motorbike riders have slow progression or recovery than normal weight riders. Daily exercise can resist developing LBP for motorbike riders. Occupational society should pay attention to daily physical exercise and also have to use necessary orthotics for reduced vibration and driving-related hazards. Motorbike riders should take a monthly follow-up from physiotherapists or occupational therapists to avoid physical disorders.

Conflict of interest

The authors have no hidden conflict of interest relevant to this article was reported.

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