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Lifting Belts: A Review

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This article reviews and evaluates the literature related to the effectiveness of protective restraints on abdominal strength, lower back injuries, and workers' discomfort. The studies indicate that back belts have potential disadvantages as well as advantages. Belts seem to reduce lifting stress. They may, however, lead to a false sense of security while being worn and may also weaken the body, so injury occurs when they are not being worn. There also seems to be comfort problems with some belts. More scientific research is needed before any conclusions can be drawn about positive, negative, or long-term effects of lifting belts.

abdominal supports   lifting belts   back pain

1. INTRODUCTION

Musculoskeletal injuries are among the most common problems in occupational medicine. The National Institute for Occupational Safety and Health (NIOSH, 1981) reported that about 35% of all compensation claims in the United States are related to back injuries. The number of work days lost because of back pain is approximately 1.4 days per worker per year. The NIOSH report also stated that approximately one third of the U.S. work force is required to exert significant strength as part of their jobs. Dynamic pushing and pulling activities are very common in many industries and are significant represented in accidents; 67% of material handling accidents were due to lifting and 20% to pushing and pulling.

A number of intervention programs have evolved to reduce lower back injuries through educational programs. "Back schools" typically consist of classroom training in the proper use of one's body. Orthotic devices, most notably lumbosacral orthoses or back braces (lifting belts), have been used extensively in the remediation of chronic lower back pain and discomfort. Weight lifters and, quite recently, manual material handlers in industry have reported some perceived benefit from wearing an abdominal belt.

However, there is a group of researchers that do not believe that lifting belts are beneficial to workers. "This is because it, in manner of its use, interferes with the normal mechanisms of the human body" (S. Kumar, personal communication, September 19, 1992). The altered training of the human physiology and anatomy may render the body unable to cope in the absence of a belt. Lifting belts do not eliminate the workers' exposure to a hazard. They treat the symptoms and not the causes. In addition, an extensive use of an abdominal belt may weaken the lower back muscles so that the muscle group becomes dependent on the support. On the other hand, several studies have confirmed that the use of abdominal and back supports aids in the compression of the abdominal compartment and, therefore, bears some of the load that would otherwise contribute to spinal compression. The belts provide external support and thus serve to increase the intra abdominal pressure (IAP), which, in turn, reduces the load on the lumbar spine during lifting. Additionally, belts provide a placebo effect that reminds people

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to exercise caution while lifting (Congleton et al., 1993). Research indicates the placebo effect occurs even when the belts are improperly worn (Congleton et al., 1993).

This article reports on a number of studies investigating the effects of lifting belts.

2. BELT CHARACTERISTICS

Belts come in many styles, sizes, and colors. Some have straps and some do not. Some are air-filled. They can be made of leather, nylon, and many other materials. Some are wide (150 mm) and some are narrow (100 mm). Because there is no distinction in belts for male and female wearers, the 100 mm width belt is normally suggested for women. "Despite the wide variety of belts on the market, one thing is certain: The back-support belt is increasing in popularity and its manufacturers are reporting a dramatic increase in sales" (Tomecek, 1992, p. 32).

The nonleather belts are designed to be lightweight, provide maximum comfort, remain highly durable, and furnish excellent lower back support. According to manufacturers, a typical nonleather belt features:

- A double-touch fastening system that provides two separate layers of self-gripping fasteners that overlap at the abdomen and promote IAP.
- An outer shell made of Anthron flexible fabric for rugged wear.
- Foam core for back support with comfort.
- Various colors (black, blue, red, etc.).
- Optional suspenders.
- Six sizes (waist in mm): extra small (450–600), small (600–750), medium (750–900), large (900–1050), extra large (1050–1200), and extra, extra large (1200–1350).

3. LITERATURE REVIEW

Grew and Deane (1982) investigated the physical effects of lumbar spinal supports. Two groups were studied: a group of 10 normal male participants and a group of 8 male lower-back pain patients. Five different spinal supports were investigated: Their effects on the back skin temperature, spinal movements, and IAP were examined. This study confirmed that spinal supports influence the skin temperature, movement, and IAP. In order to reduce spinal movement by an appreciable amount, a rigid form of bracing is required, although a well-fitting brace was better than a plastic shell in this respect. Where lower-back pain is temperature sensitive, the presence of thicker or padded material can be used to raise the skin temperature by almost 35.6°F (2°C). It was concluded that longer supports provided significant increases in IAP when the wearer was walking. Grew and Deane concluded that an extensive use of an abdominal belt may tend to weaken the lower back muscles if this muscle group becomes dependent on the support.

Hemburg (1983) studied the effect of two types of belts during lifting on the activity of the oblique abdominal muscles and the erector spinae muscle and on the IAP and intrathoracic pressure. The two belts were the common weight-lifting leather belt and a specially made belt of flexible, nonelastic syrlon (a thermoplastic material) with an extended abdominal support. Twenty participants from the construction industry with chronic lowerback pain and 10 well-trained weight lifters participated in the experiment. The results showed that the IAP rose moderately before, during, and after all types of lifts, whereas the intrathoracic pressure was only slightly increased during some types of lifts. In this respect, there was no difference between the support of syrlon and the weight-lifting belt.

Nachemson, Schultz, and Anderson (1983) investigated the effectiveness of lumbar orthoses in reducing spinal loading while participants performed isometric loading tasks. Three types of lumbar spine orthoses (Camp canvas corset, Raney flexion jacket, and the Boston brace) were compared to the no-belt (control) condition for six specified isometric loading tasks. Four healthy volunteers (three men and one woman; 19 – 23 years old) participated in the experiment. The intradiscal pressure (IDP), IAP, and electromyographical (EMG) activity of the erector spinae and oblique abdominal trunk muscles were measured. The IDP values with an orthosis were lower in about two thirds of the tasks and higher in the remaining one third. The IAP and EMG values showed no consistent trends resulting from wearing orthoses. The amount of compression relief provided by each of the orthoses was estimated by predicting the difference in compression force between the orthosis and the control condition. This was accomplished by estimating the loads that would have been imposed on the lumbar trunk in each task, assuming no orthosis was worn, and then predicting the compression force from the IDP and EMG values for when an orthosis was worn. These predictions then underwent linear regression analysis to compare measured IDP to predicted compression force. On the basis of the regression analyses, Nachemson et al. concluded that all three orthoses reduced spinal compression.

The results cannot be used to determine if industrial back belts significantly reduce spinal compression because only therapeutic type lumbar orthoses were tested in Nachemson et al.'s (1983) study. The study also suffers from the small size of the sample and incomplete testings (the lumbar orthoses were not tested on all four participants).

Kumar and Godfrey (1986) evaluated six commonly prescribed spinal supports. Twenty participants (11 men, 9 women) who had no back disorder history were fitted in turn with a sacroiliac belt, lumbosacral corset, Harris, Macnob, Knight, and Taylor braces. The participants performed sagittal, lateral, and oblique plane-stoop lifting (loads of 7 and 9 kg) and same-level, side-to-side weight transfers.

The results showed that, in all lifts, the IAP stayed within a narrow range of variation with various braces. The variation within the range did not follow a set pattern for men or women. The sacroiliac belt generated higher pressure more often than any other support. Based on the criterion of the IAP, there was no significant difference between the braces tested. In the sagittal plane lifting of these loads with no bracing, peak IAP was in the area of 44 mmHg for men and 20 mmHg for women. Wearing the supports did not result in appreciably higher IAP. However, Kumar and Godfrey (1986) noted that different braces restricted the torso movement differently. They concluded that the choice of spinal support should be based on criteria other than abdominal support.

McCoy, Congleton, Johnston, and Jiang (1988) investigated the effects of two belts on load lifting capabilities of individuals using the psychophysical method, subjective surveys, and the measurement of external pressure on the abdomen. The Air belt had an inflatable bladder and the Comp Vest belt had a mechanical elastic support. Twelve male college students lifted tote boxes from the floor to knuckle height at a rate of three lifts per minute for a period of 45 min. The belts increased the perceived maximum acceptable weight of lift with respect to the control (no belt) group; however, there was no significant difference in perceived weight between the two belts. The IAP generated by the two belts were essentially the same. The results of the subjective surveys tended to favor the Comp Vest belt over the Air belt.

Alaranta and Murri (1988) studied the relief of lower back pain while wearing a lumbar support. The factory of the Prosthetic Foundation in Helsinki, Finland delivers about 1,000 elastic, semirigid, or rigid lumbar supports each year to lower back pain patients. During 1988, questionnaires were mailed to 235 consecutive patients who had 1 year earlier received their first elastic or semirigid braced corset for lower back pain form the factory. A total of 186 patients, 71 men (38%) and 115 women (62%) completed and returned the structured questionnaire. Patients with back injury or a history of spinal surgery, malignancy, tuberculosis, idiopathic scoliosis, or any acute disorder as a cause of lower back pain were excluded. The final study group of patients with chronic (greater than 6 months), idiopathic lower back pain was comprised of 75 women and 38 men. Subjective relief obtained from the corset was reported as excellent or good by 37% but as slight or negligible by 63% of the patients. A total of 40% reported having last worn the corset during the preceding week and 20% during 2 to 4 weeks previously. When patients wore the corset, 23% wore it less than 2 hr, 31% from 2 to 6 hr, and 46% more than 6 hr per day. There were no significant differences between the genders concerning relief or the use of the corset. Low-sacrolumbar semirigid and low-elastic models were better for men and high-sacrothoracic semirigid models were better for women. Age, height, weight, body mass index, and physical strenuousness of work showed no correlation with the subjective help obtained from the corset. Many patients, more than 40%, reported a subjective weakening of the trunk muscles because of the corset. Alaranta and Murri concluded that it is important that sufficient time be allocated to fitting the corset and that adequate information be provided about wearing the brace and about suitable trunk exercises.

Amendola (1989) evaluated the utility of the Air belt, Comp Vest, and a combination of the Air belt and Comp Vest, with a no-device control for manual lifting in 12 college males. None of the devices were significantly different from the control for maximum acceptable weight of lift over all the participants. There was no significant difference in the compressive force in the lower back and for body part discomfort among the device treatments. No preference for any device was subjectively determined.

Harman, Rosenstein, Frykman, and Ningo (1989) investigated the effects of a belt on IAP during weight lifting. IAP and the vertical ground reaction force (GRF) were monitored while nine participants (eight men, one women) dead lifted a barrel (average load 1.85 body weight) both with and without a lifting belt at 90% of repetition maximum. Both IAP and GRF rose sharply form the time force was first exerted on the barrel until shortly after it left the floor, after which GRF actually plateaued, while IAP either plateaued or declined. With the belt, IAP increased significantly earlier than without the belt. The peak IAP with the belt was about 173 mmHg and without the belt it was 158 mmHg, a statistically significant difference. Harman et al. concluded that the use of a lifting belt increases IAP, which may reduce disc compressive force and improve lifting safety.

Harman et al. (1989) also recommend that a belt always be employed for maximal or near maximal lifting and that someone who lifts regularly with a belt should be extremely cautious about lifting without one. A lifter accustomed to using a belt, when trying to lift without one, may generate less IAP than if he or she had trained regularly with no belt. Training with a belt may not reduce vulnerability to injury during lifts without a belt.

McGill, Norman, and Sharratt (1990) investigated whether abdominal belts reduced trunk muscle activity, increased IAP, or both. Six participants performed lifts (loads of 73–91 kg) on a lifting machine with and without wearing a weight lifting belt. In addition, the participants lifted loads both with the breath held and continuously expiring on lifting effort. Dynamic hand loads, abdominal and IAP, and intercostal and lower back EMG were recorded. IAP increased when wearing the belt during both breathing conditions: 99 mmHg with no belt and 120 mmHg with a belt. Significant increases in IAP occurred when the breath was held versus exhaling with or without belts, suggesting reduced lumbar compressive load. McGill et al. concluded that their muscle activity and IAP results during short duration lifting tasks make it difficult to justify the prescription of abdominal belts to workers.

Penrose, Chook, and Stump (1991) examined the casual influence of wearing an Air belt (pneumatic lumbar support) on the development of muscular strength, hip and back flexibility, and a functional impairment (pain) index. Thirty participants were randomly selected from a pool of individuals who were diagnosed as having muscular strain or sprain of the lower back by an orthopedic–neurologic examination on which they were graded as mildly, moderately, or severely injured. Participants in the treatment and control groups were matched according to gender and grade of strain or sprain. Each participant was tested after 1 hr and then 3 weeks into the program and was posttested after 6 weeks of therapy or control. Participants treatment group were required to wear the Air belt for 1 hr after a pretest and then for 6 hr a day, 5 days a week, for 6 weeks. Muscular strength improved 5% after wearing the Air belt for 1 hr, 11% after 3 weeks, and 16% after 6 weeks of use. Because these participants were functionally impaired as a result of lower back sprain or strain, the Air belt appears to improve the strength otherwise lost due to a lower back injury. Penrose et al. concluded that the use of the Air belt aids in flexibility and lessens the pain perceived in functionally impaired participants. The subjective assessment of pain decreased by 18% after 1 hr of Air belt use, 46% after 3 weeks, and 73% after 6 weeks of use. Flexibility improved 35%, 70%, and 93%, respectively.

Walsh and Schwartz (1990) studied the influence of prophylactic orthoses on abdominal strength and lower back injury in the workplace. The participants were 90 male warehouse workers randomly selected from over 800 employees at a grocery distribution center. The participants were assigned to three groups: (a) true controls (no back school, no brace orthosis), (b) back school training only, and (c) back school plus wearing a custom molded lumbosacral orthosis. Comparisons of pretesting and a 6-month follow-up posttesting for abdominal strength, cognitive data (a 25-question multiple-choice test concerning the care of the back and proper body mechanics), work injury incidence and productivity, and the use of health care services were evaluated. The controls and the training-only group showed no changes in strength, productivity, or accident rate; however, they showed substantially less lost time. The combination of training and orthotic intervention was superior to training intervention alone as measured by a decrease in time lost from work because of back injury. Walsh and Schwartz concluded that the use of intermittent prophylactic bracing has no adverse effects on abdominal muscle strength and may contribute to decreased lost time from work injuries.

Bourne and Reilly (1991) examined the effects of a standard weight-lifting belt in attenuating spinal shrinkage. Eight male participants (*M* age = 25 years) performed two sequences of circuit weight training, one without a belt and, on a separate occasion, with a belt. Six common weight-training exercises were specifically chosen to load the spine to varying degrees. These were performed in three sets of 10 with a change of exercise after each set of 10 repetitions. A stadiometer sensitive to within .01 mm was used to record alternations in stature. The measurements of stature were taken before and after the completion of the circuit. The absolute visual analogue scale was used to measure the discomfort and pain intensity resulting from each of the two conditions. The results indicate that the circuit weight training caused stature losses of 3.5 mm without the belt and 2.9 mm with the belt ($p > .05$). The participants complained of significantly less comfort when the belt was worn. The degree of shrinkage was significantly correlated ($R^2 = 56\%$) with perceived discomfort, but only when the belt was not worn. Bourne and Reilly concluded that the results suggest the potential benefits of wearing a weight-lifting belt and the belt can help in stabilizing the trunk.

Hilgen, Smith, and Lanoler (1991) evaluated biomechanical and physiological data from stooped lifting tasks so as to contribute a "minimum abdominal belt-aided lifting weight." The relative effectiveness of two different styles of abdominal belts (Air belt and ProFlex) were also analyzed. Five men who possessed weight lifting experience participated in this experiment. The five weights lifted ranged from 11 to 31 kg in increments of 5 kg. The Air belt yielded the lowest integrated electromyographical (iEMG) activity, moment impulses, and spinal forces impulses at the middle stages of the lift. The ProFlex belt generated the lowest iEMG activity, moments, spinal forces, and moment and spinal forces impulses at the initial stage of the lift. Hilgen et al. concluded that fitting workers with abdominal belts should include formal training to eliminate any mental enhancement that may be given by an abdominal belt.

Holmstrom and Moritz (1992) studied the effect on maximal isometric trunk muscle strength and endurance after wearing a soft heat-retaining lumbar belt or a weight-lifting belt. The soft, heat-retaining belt was made of a neoprene material called Neocamp. The weight-lifting belt was made of leather. The soft-belt study group had 12 construction workers with healthy backs and the weight-lifting-belt group had 24 construction workers with current or previous lower back pain. The strength and endurance measurements were performed before the start of belt use after 1 and 2 months. At that time, the participants were interviewed about their experience of wearing a belt at work. The soft-belt study group did not show any significant difference in the trunk extensor strength or endurance between the initial measurements and those taken after 2-month use of the belts. The trunk flexor strength increased by 13% from the first to the third measurement. In the weight-lifting-belt group, the trunk extensor strength did not change significantly after a 2-month use of the belts. The trunk extensor endurance significantly decreased after 1 month. The trunk flexor strength increased by 12% and the trunk flexor endurance time increased by 29% after a 2-month use.

For the soft-belt group, 8 workers reported 7 to 10 hr of daily use and 4 workers reported 3 to 6 hr. In the weight-lifting-belt group, 17 participants reported 7 to 10 hr of daily belt use and the other 7 reported 3 to 6 hr. A significant correlation between the total amount of weight-lifting belt use and increase in trunk flexor strength was found.

Udo et al. (1992) studied the effect of wearing a preventive belt during heavy materials handling. Sixty male workers, who were occupationally carrying rice bags and who had experienced lower back pain, were selected. Half of the workers wore a preventive belt during work, for a period of 5½ months, whereas the other half did not. Examinations concerning lowerback pain were conducted at the beginning and 2½ and 5½ months after the start of the study. The examinations included maximum lumbar flexion, fingertip to floor distance in forward bending, pains in the lower back in forward, backward, or sideways bending of the upper body, muscle tenderness thresholds in the lower back, and the Lasegue test. Sixteen pairs were chosen from the two groups by matching age, type of trucks used at work, and the level of the total estimated lumbar kinetic score. The results showed that the pain score for the belt group was significantly improved as compared with the no-belt group.

Of the workers, 56% of the belt group showed an improvement in the kinetic pain score or in muscle tenderness thresholds as compared to 19% for the no-belt group. Subjective estimates of lower back pain also improved significantly in the belt group as compared with the no-belt group. There was no incidence of acute lumbar sprain at work during the study period for the belt group, which contrasted with the incidence rate of 17% in the no-belt group. Udo et al. (1992) concluded that the belts are useful in reducing the lumbar load and reducing the incidence of lumbar sprain.

Reddell, Congleton, Huchingson, and Montgomery (1992) evaluated the efficiency of a commercially available weight-lifting belt in relation to the reduction of lumbar injury incident rate and the severity of injuries over a 8-month period. The participants were 642 baggage handlers working for a major airline. The participants were assigned randomly to four treatment groups: (a) a group receiving the belt only, (b) a group receiving a 1-hr training class only, (c) a group receiving both a belt and a 1-hr training class, and (d) a control group receiving nothing. There were no significant differences for total lumbar injury incident rate, restricted workday case-injury incident rate, lost workdays and restricted workdays rate, and worker's compensation rates. Groups with participants who wore the belt for a while and then discontinued its use had a higher lost day case injury incident rate than either the group receiving training only or the control group. Of the participants issued with a weight-lifting belt, 58% stopped using it before the end of the 8 months. Comments indicated that the belt was too hot, rubbed, pinched, and that it caused bruised ribs.

Reddell et al. (1992) concluded that the weight-lifting belt used in their study cannot be recommended as a lifting aid during daily work activities of baggage handlers. They also stated that use of the belts may increase the risk of injury when not wearing a belt following a period of wearing a belt.

Udo, Yoshinaga, Tanida, Urino, and Yoshioka (1993) studied the effect of wearing a preventive belt during crane operation. This type of work involves long hours of sitting as well as whole-body vibration. Sixty male workers (crane operators) who had experienced lowerback pain were selected. Half of them wore a preventive belt during work for 1 year, whereas the other half did not. The results of the two groups (29 participants in the belt group; 24 participants in the no-belt group; 7 participants did not complete the experiment) were compared. Examinations concerning lower back pain were conducted before the experiment, 6 months, and 1 year after the start of the study. They included the same variables as in the previous study (Udo et al., 1992).

There were no significant differences in age, length of service, body height, the Broca index, lower-back pain findings, and crane-operating hours between the two groups. The belt group, as compared with the no-belt group, had significant improvement in terms of the following examinations: the kinetic pain score in forward bending, muscle tenderness thresholds in the right L4 and L5 levels, muscle tenderness threshold for the total levels, and the Lasegue test on the right side. Of the belt group, 59% of the workers showed an improvement in the kinetic pain score or in muscle tenderness as compared with 29% for the no-belt workers. Subjective estimates of lower back pain also improved significantly in the belt group compared with the no-belt group.

Mitchell et al. (1994) investigated the effectiveness of back belts in reducing back injuries and the associated costs. The study consisted of a self-administered questionnaire given to 1,316 workers who routinely perform manual lifting activities to determine exposure information on lift frequency, weight of lifts and the proportion of the workday spent lifting, belt use, the history of back problems, and treatment for the period 1985 to 1991. For the first 2 years (i.e., 1985 and 1986) leather belts were used and for the remaining years a standard Velcro back support with suspenders was used. Based on univariate analyses of variance (ANOVAs) related to initial injury, it was concluded that previous lifting training, previous back problems, and amount of weight lifted per day were significantly correlated with initial injury but belt use at the time of injury was not. Regression analyses revealed that a history of previous back problems and the amount of weight lifted per day were positively related to the first occurrences of back injury and that previous training and belt use were negatively related to first back injury. During the course of the study, the back-belt usage was not controlled. This study did not provide conclusive evidence that back belts significantly reduce the risk of injury. The results do suggest, however, that certain work-related factors, namely a history of previous back problems and the daily amount of weight lifted, significantly increase the risk of back injuries.

Lavender and Kenyeri (1995) hypothesized that if lifting belts supply an individual with mechanical, motivational advantage, or both, then the individual should be willing to lift larger loads while wearing a lifting belt. In this study, a psychophysical evaluation was used. The participants were asked to determine an acceptable load for the given lifting conditions. The main objective of this study was to compare the maximum acceptable weight of lift (MAWL) determined with and without the use of a lifting belt. Sixteen participants (11 men 5 women) participated in four psychophysical lifting tests during two sessions (no belt, spandex-type lifting belt). The participants were required to lift a box from the height of 30 cm to a shelf positioned in such a way that box handles would be at standing elbow height. The lifts were performed at a rate of 2 lifts per minute. The participants adjusted the amount of weight in the box during the 40-min test to arrive at a value they considered the maximum they could sustain for 8-hr period.

A repeated-measured ANOVA showed no difference either between the MAWL for the belt and no-belt condition or between the two psychophysical lifting tasks within each condition. This indicated that these two tests produced consistent results, regardless of the critical weight of the box.

Although on average the women lifted approximately 5 kg less than the men (15.9 kg vs. 20.3 kg), the difference was not statistically significant. Moreover, the interaction between the belt conditions and the participant's gender did not affect the way the MAWL was adjusted in the belt and no-belt conditions. The participants were split with regard to comfort and safety issues. The participants reported increased perspiration with the belt but did not report any itching sensation.

The study concluded that lifting belts offered no strength or motivational advantage to the user. The use of lifting belts did not appear to offer a significant biomechanical or motivational advantage to the user when handling loads considered acceptable in repetitive material handling tasks.

4. DISCUSSION

The previously described studies, as a group, are limited by a number of factors that restrict a direct application of the data to the working population. For the most part, the study limitations include (a) the fact that the studies were carried out in a controlled environment, (b) the small sample sizes, (c) the type of participants used in the studies (young male college students), (d) the duration of the studies, and (e) the evaluation of different types of belts and lifting postures, frequencies, and weight criterion that limits the comparability of the results with other studies.

The best way to eliminate or reduce back injuries is through ergonomic evaluation and implementation of engineering controls (Congleton et al., 1993). Eliminating or reducing hazardous tasks, decreasing job demands, and minimizing body movements are three goals of job design. A strong advantage of engineering controls is that it is a permanent change as opposed to the temporary effects of personnel selection and training.

Back injuries can be prevented or reduced with such appropriate intervention measures as:

1. *Substitution or automation.* One solution is to eliminate the person. Machines, robots, hoists, cranes, and dollies can substitute the workers in some aspects of the manual handling of materials.
2. *Improved equipment design.* Improved design of some equipment virtually eliminates some hazardous tasks.
3. *Task design.* Manual tasks can be altered to minimize stress to the worker (NIOSH, 1981).
4. *Variation of work practices.* Job enlargement or a periodic rotation of workers into jobs with different physical demands may help reduce the effect of biomechanical stress.
5. *Change of work are layout.* The height of work level or worker level can be changed. All materials can be provided at work level.
6. *Reduce bending motions.* Deep shelves should not be used. Objects should be located within arm's reach.
7. *Reduce twisting motions.* Seated operators should be provided with adjustable swivel chairs.

5. SUMMARY AND CONCLUSIONS

Industry today is looking for new methods of dealing with the increasing cost of—and lost work days to—lower back injuries. Industrial back belts (a form of personal protective equipment) is a remedy that more and more employers are turning to in order to solve their problems. Companies choose to use them in order to demonstrate, quickly and inexpensively, their wish to prevent back injuries.

The studies indicate that back belts have potential disadvantages as well as advantages. Belts seem to reduce lifting stress. They may, however, lead to a false sense of security while being worn and may weaken the body so injury occurs when they are not being worn. There also seems to be comfort problems with some belts.

Most of the studies described in this article have been conducted in controlled environments (campus laboratories) and have used mainly college-age (with the typical age of 24 years), weight-lifting men for short periods of time (less than 6 months and often less than 6 hr). More long-term studies in uncontrolled environments (in the workplace) need to be conducted.

In the most recent NIOSH (1994) report, it was concluded that:

- There are insufficient data indicating that typical industrial back belts significantly reduce the biomechanical loading of the trunk during manual lifting.
- There is insufficient scientific evidence to conclude that wearing back belts reduces the risk of injury to the back based on changes in IAP and trunk muscle EMG.
- The use of back belts may produce temporary strain on the cardiovascular system.
- There are insufficient data to demonstrate a relation between the prevalence of back injury in healthy workers and the discontinuation of back belt use.

The NIOSH (1994) report also concluded that the effectiveness of using back belts to lessen the risk of back injury among uninjured workers remains unproven. The report did not recommend the use of back belts to prevent injuries among uninjured workers and did not consider back belts to be personal protective equipment. The NIOSH report further emphasized that back belts do not mitigate the hazards posed by repeated lifting, pushing, pulling, twisting, or bending.

In the meantime, employers should be looking for ways to eliminate or reduce back injuries through ergonomic evaluation and implementation of engineering controls. Personal protective equipment (e.g., back belts) are a supplement to engineering controls, not a replacement. More scientific research is needed before any conclusions can be drawn about positive, negative, or long-term effects of lifting belts.

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