

Hipster fashion and body alignment

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ABSTRACT

Introduction: Deviations from normal body alignment can result in postural deformities or medical conditions which can influence occupational functioning. It has been determined that clothing influences body alignment because of somatosensory feedback and the consequent postural adaptation.

Aim: The purpose of this study was to examine the influence of hipster jeans on body alignment compared with regular jeans.

Methodology: The body alignment of sixty participants were measured on two occasions: first wearing hipster-fit and then regular-fit jeans. Photographs were taken on both occasions from a frontal and a lateral view. Body alignment was analysed using the Posture Analysis Toolkit (PAT). Questionnaires on demographics and comfort levels whilst wearing the jeans were completed by participants on both occasions.

Results: Participants reported varying levels of discomfort when carrying out basic movements whilst wearing hipster fit jeans. Most (66.7%) participants felt no discomfort in their regular fit jeans. From a lateral view, there was a tendency for posture to deviate from the plumb line if participants wore hipster jeans. This difference was statistically significant at the greater trochanter (95% CI [2 ; 17]) and the ear lobe (95% CI [5 ; 24]).

Conclusion: These results suggest that hipster jeans influence body alignment, the most common deviation being an anterior pelvic tilt, which leads to poor posture.

Key words: Body alignment, Posture, Hipster fashion, Postural deviation

Ethics clearance number: 06-07

Introduction

Participation in and the effective execution of human activities require the maintenance of correct posture. Posture is a composite of the positions of all the joints of the body at any given moment¹. It reflects a relative arrangement of various parts of the body which changes with position and movement². This unique arrangement of body parts is essentially referred to as body alignment³.

Research has shown that incorrect body alignment could have a negative effect on the general health of a person, resulting in numerous medical conditions and occupational afflictions^{4,5,6}. A positive relation exists between postural stress and scoliosis, office work, driving, sitting, sports injuries and back pain⁷. The implications of lower back pain on the occupational performance, interpersonal relationships and quality of life are well reported phenomena of concern to health practitioners. An association of medical pain specialists found that 72% of patients seeking treatment for back pain reported giving up all sports-related activities. Additionally, 60% said they were unable to perform many daily activities⁸. Furthermore, the implications of low back pain on the economy and workforce are serious. The most recent statistics available indicate that 80% of South Africa's workforce is suffering from severe discomfort at any given time, and even disability due to lower back pain. From an economic perspective, it costs the country more than R2 billion per annum⁹. The lifetime prevalence of lower back pain is 60-80% in industrialised countries¹⁰.

Research indicates that lower back pain can be avoided through correct body alignment^{11,12}, specifically during activity participation¹³ and particularly during the younger years¹⁴. Obstacles to efficient posture and movement have been identified in the literature^{15,16,17}.

The impact of footwear on body alignment has been thoroughly researched^{18,19,20,21}. Opila *et al*¹⁸ and De Lateur *et al*¹⁹ found that high-heeled shoes changed the normal posture of the back. Their research showed that wearing high-heeled shoes caused postural adjustment, and accumulated strain on the lower back muscles, which might result in hyperlordosis of the lumbar spine. Essentially, wearing high heels for any length of time increases the normal

lumbar curve of the spinal column, and causes the pelvis to rotate anteriorly. The normal configuration of the pelvis and spinal column undergo biomechanical adjustment and stress is consequently put on the equilibrium responses necessary for the body to maintain its centre of gravity over the base of support²².

Although many studies have investigated the impact of footwear on postural alignment, a limited number of studies have been done on the relationship between clothing and postural alignment. Studies on clothing have revealed that tight clothing restricts a person from moving comfortably^{23,24,25}, and that specific clothing showed the potential to increase field performance and worker comfort²⁶.

Neurophysiology literature^{27,28} and research results suggest that individuals respond in a certain way to sensory experiences²⁹ and adjust their behaviour accordingly. A growing body of evidence implicates the large role of tactile cues in the control of posture³⁰. Rogers *et al.*³¹ argued that if passive sensory input about posture is available, the postural control process adapts to this input. In the context of this research, responses to tactile input resulting from clothing facilitate movement and comfort for the individual.

Of particular interest is the impact of hipster clothing on the alignment of the body. Fashion garments, such as hipster jeans, were identified as a potential clothing danger to the unique sensory feedback caused by the level of the hipster's waistband. Younger and younger generations follow fashion and children as young as seven years old wear hipsters. With the spinal column still in a maturing stage of development¹⁴, these are crucial years in the development of posture. Therefore, the research question was: What changes in body alignment occur when wearing hipster jeans compared to regular jeans?

Methodology

Study sample

Female students at the University of the Free State were selected for this quantitative, observational, analytical, cross-sectional prospective study. Consent was obtained from the Ethics committee of the Faculty of Health Sciences, the Dean of Students, Dean of Academic affairs,



the House Committees of the respective hostels, and the students participating in the study. Sixty participants from five female residences volunteered to participate in the study. Participants were excluded if they had any diagnosed spinal column deformities, spinal fusion, a diagnosed major mood disorder, a lower limb disability or impairment, and chronic low back pain. These problems were verbally determined during the recruitment process. Because the focus was on normal posture it required the following to be excluded: professional dancers, models, horse-riders, gymnasts or students of the departments of Biokinetics, Occupational Therapy and Physiotherapy.

A house meeting was convened at each of the five residences where prospective participants were informed and recruited for the study. An information document was provided in which the study was explained and informed consent was requested. In order to clarify the terms hipster- and regular fit jeans, a short description of each was provided to participants. Each participant had to possess both a regular jean and a hipster-fit jean. Participants had to adhere to the criteria for the study before measurements were taken.

Methods

A hipster-jean is a jean that measures between 7.6 cm and 18 cm from the crotch to the waistband³². For the purpose of this study, a hipster jean was thus defined as one in which the waistband fitted on or below the anterior superior iliac spine. The definition of a regular fit jean, according to literature, is 24 cm from the crotch to the waistband³². For the purpose of this study, a regular fit jean was defined as one in which the waistband fitted on or above the crista iliaca.

Measurement of body alignment was done at each student residence. A station for assessment of body alignment was set up in a pre-scheduled room at each residence. Each participant was provided with a shirt of suitable size which was worn during measurement, and all shirts were of identical make. Anatomical landmarks were indicated on participants by means of coloured stickers (Figure 1), and a plumb line was digitally drawn (Figure 2) to specify correct body alignment, using the following designated landmarks:



Figure 1: Photographs were taken from an anterior and a lateral view. Anatomical landmarks were marked by coloured stickers

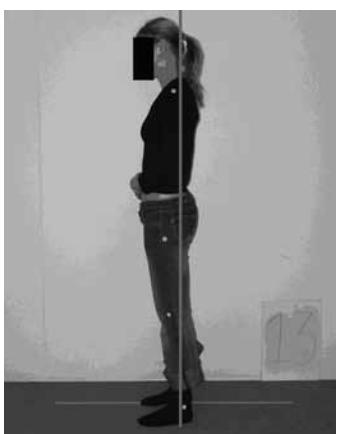


Figure 2: A graphical representation of the plumb line as calculated by PAT

- (a) Anterior position: starting at the mid-medial malleoli, through mid-knee, mid-pubis, naval, sternum and nose.
- (b) Lateral position: starting anterior to lateral malleolus, through the anterior mid-knee, greater trochanter, mid-acromion and mid-ear lobe.

Measurements of body alignment were taken within a two week period, henceforth referred to as the first week and the second week. Selected residences were allocated to a specific day of the week during which photographs were taken. This day remained constant for both the first and second week. During the first week photographs were taken of participants wearing regular fit jeans, and during the second week participants wore hipster fit jeans. No shoes were worn. Students were informed to wear the specified jean for at least three hours before the second consultation measurement. A digital camera (SONY Cyber-shot) was positioned at a distance of 3 metres from the participant and at a height of 78.5cm.

A questionnaire was completed by each participant on both occasions after the photographs had been taken. The questionnaire recorded information such as age, weight, height, type of jeans worn, duration of wearing the jeans that day, as well as information pertaining to body alignment whilst wearing the specified jeans. Questions regarding comfort, adjustment, posture compensation, pain and regularity of use per jean were also included.

The anterior and lateral-left photographs were loaded onto a computer for analysis using PAT (Posture Analysis Toolkit), a custom-designed computer program written exclusively for this study (see Acknowledgements). Digital photography provides not only a realistic two dimensional visualisation of objects, but also allows unlimited retrieval of the photograph. All measurements were made manually on the computer at body landmark locations determined for each individual participant. The anterior view photograph was loaded into the program first. This process started off with the plumb line as basis (the mid-medial malleoli), then working upward through all points mentioned. A calibration length of 1 000 millimetres was entered so that all deviations could be converted into millimetres. The lateral-left photograph was then loaded and the same procedure followed. After all the anatomical landmarks were entered for both photographs, a report was generated for the specific participant. BMI was calculated by dividing the weight in kilograms by height in m^2 .³³

Descriptive statistics, namely medians and quartiles for continuous data, and frequencies and percentages for categorical data were calculated. 95% Confidence Intervals (CI) for paired data were calculated to compare hipsters and regular fit jeans.

Results

Sixty participants took part in the study. Ages ranged from 17 to 24 years, the median age being 19 years. Most (78.3%) participants were classified as having a normal healthy body mass according to the Body Mass Index (BMI)³³. A further 21.7% were classified as slightly over- or under-weight. Classifications were based on international recommendations, underweight being defined as a BMI of less than 18.5 kg/m^2 , normal weight as 18.5 to 24.9 kg/m^2 , overweight as 25.0 to 29.9 kg/m^2 and obesity for a BMI greater than or equal to 30 kg/m^2 .³³

The number of hours spent wearing the jeans prior to participation ranged between three and 10 hours (median 4 hours). During the first consultation, the regular fit jeans were photographed at a median time of 14h38 whilst the hipster jeans were photographed at a median time of 12h34 during the second consultation. The number of days between consultations ranged between zero and 11 days, with 91.7% of participants having seven days between consultations. Due to academic responsibilities a few students (6.7%) had their second measurement taken more than one week apart.

Only 31.7% of the participants wore their hipster jeans more than three times a week, while 40% of the participants wore their regular fit jeans only once a week. Significantly more parti-

pants wore hipsters more often than regular jeans (95% CI [11.7% ; 51.5%]). Most participants (63.3%) reported that they preferred wearing their hipster jeans.

Few (18.3%) participants considered the possibility of a correlation between discomfort/pain and the type of jeans worn.

Discomfort when sitting, standing, picking up objects and climbing stairs were experienced by 78.3% while wearing hipsters and 35% while wearing regular jeans. The hipster jeans and regular fit jeans were compared (*Table I*). Participants had significantly greater discomfort when sitting and bending while wearing hipster jeans, compared with regular jeans.

Table I: Percentage of discomfort while carry out basic movements

Activity	Hipster jeans	Regular jeans	95% CI for the percentage difference
Sitting	51.7	18.3	[15.9 ; 48.1]*
Bending	58.3	21.7	[18.9 ; 51.4]*
Climbing steps	21.7	11.7	[-2.7 ; 22.7]
No discomfort	25	66.7	[-56.3 ; -23.4]*
Standing	13	15	[-12.6 ; 9.2]

* Statistically significant difference showing greater discomfort in hipster jeans

The participants reported a need to adjust other items of clothing (e.g. shirt) while performing activities mentioned in *Table I* when wearing both types of jeans. The needs were divided into four categories: those who had to adjust clothing when wearing either hipster or regular jeans (20 of the 60 participants, 33.3%); not having to adjust clothing at all (6 of the 60 participants, 10.0%); only adjusting clothing when wearing hipster jeans (33 of the 60 participants, 55%); and finally only adjusting clothing when wearing regular jeans (1 of the 60 participants, 1.7%).

From a frontal view a general tendency was demonstrated for participants to deviate towards the left of the plumb line. This was true for both hipster (36.7 %) and regular fit jeans (46.7 %).

From a lateral view (*Table II*) a tendency existed in hipster jeans to deviate from the plumb line, which was not visible in regular jeans. This difference was statistically significant at the greater trochanter (95% CI [2 ; 17]) and the ear lobe (95% CI [5 ; 24]). There was a tendency towards deviation in hipster jeans at the anatomical landmarks of the knee and mid-acromion, though this was not statistically significant.

Table II: General deviation from the plumb line (as seen from a lateral view)

Anatomical landmark	Hipster jeans (mm)			Regular fit jeans (mm)			95% CI for median difference
	Min	Median	Max	Min	Median	Max	
Lateral malleoli		0			0		
Knee	1	33	96	1	28	72	[0 ; 12]
Greater trochanter	0	40	118	2	35	99	[2 ; 17]*
Mid-acromion	0	26	118	0	24	86	[-6 ; 19]
Mid-ear lobe	2	40.5	175	2	27.5	113	[5 ; 24]

* Statistically significant difference showing greater deviation in hipster jeans.

All statistical tendencies and significant differences showed a greater deviation in hipster jeans (*Table III*). There was a tendency

Table III: Anterior and posterior deviation from the plumb line (as seen from a lateral view)

Anatomical landmark	Hipster jeans (mm)				Regular fit jeans (mm)				95% CI for median difference
	n*	Min	Median	Max	n	Min	Median	Max	
Anterior									
Knee	53	1	37	96	7	1	34	72	[0 ; 13]
Greater trochanter	53	0	44	118	7	2	43	99	[3 ; 18]#
Mid-acromion	20	2	31.5	118	40	0	19.5	53	[-7 ; 50]
Mid-ear lobe	48	4	46	175	12	3	39	113	[2 ; 26]#
Posterior									
Knee	53	4	7	20	7	2	5	15	[-3 ; 9]
Greater trochanter	53	3	17	62	7	4	12	25	[-16 ; 57]
Mid-acromion	20	0	25.5	103	40	0	27	86	[-7 ; 18]
Mid-ear lobe	48	2	26.5	73	12	2	7.5	25	[-4 ; 43]

*n = number of participants with deviation.

Statistically significant difference showing greater deviation in hipster jeans.

towards greater deviation in hipster jeans at the knee and mid-acromion anatomical landmarks.

Discussion

Previous studies have determined that clothing influences a person's body alignment through sensory feedback and consequent motor behaviour.³⁴ Adapted somatosensory behaviour presented in two ways during this study: the need to adjust other clothing worn and the discomfort experienced while carrying out basic movements. These results are congruent with findings in literature that reflect human postural control as a response to somatosensory experiences^{29,31,35}.

A significant percentage of participants experienced more discomfort carrying out basic movements whilst wearing hipster fit jeans. This is particularly true for bending and sitting, and resulted in participants altering their normal body alignment to compensate for the discomfort. Regular fit jeans, by virtue of their higher waistband, provided sensory feedback which was more likely to encourage normal posture. It was interesting to note that nearly three times the number of participants felt no discomfort in regular fit jeans. Furthermore, four times more participants felt a necessity to adjust other items of clothing worn while wearing hipster jeans. This could be explained by the lack of sensory feedback provided by hipster fit jeans and by the discomfort resulting from basic movements^{31,36}.

Although this study did not report any major postural deviations from a frontal view, some deviations from a lateral view were statistically significant. The greatest deviation from the plumb line occurred in hipster fit jeans in an anterior direction at the ear and the greater trochanter. The lack of somatosensory feedback provided by the hipster fit jeans resulted in a decreased contribution to an upright posture, as could be seen from the anterior tilt of the pelvis in hipster jeans³⁷. This finding is congruent with the literature which suggests that external stimuli necessitates a behavioural change via the sensory integration principle^{38,36}.

The significant difference in deviation at the higher anatomical landmarks (i.e. ear and greater trochanter) could be explained biomechanically by the principle of sagittal balance¹⁹. The pelvis and spine in the sagittal plane can be considered as a linear chain of the spinal column, linking the head to the pelvis. Since the shape and orientation of each anatomic segment influences the adjacent segment, changes at one level will therefore have a direct influence on the adjacent level. A small deviation at the lower anatomical landmarks (i.e. knee) will therefore result in a relatively larger deviation at the higher anatomical landmarks, as seen with the significant results in this study.

It has been revealed in this study that hipster jeans influence body alignment significantly. The most common deviation occurred

as an anterior pelvic tilt. Kendall, McCreary and Provance¹ indicated that an anterior (forward) trunk lean may lead to increased lordosis causing compression of the lumbar vertebral bodies and facet joints, increased interdisc pressure; and narrowing of the intervertebral foramina resulting in chronic lumbar pain disorders. Further compensation can occur in the cervical spine, resulting in temporal-mandibular joint dysfunction; cervical spine dysfunction; radicular symptoms; thoracic outlet syndrome; and other upper cervical pathologies³⁹. Poor posture may also result in potentially debilitating problems such as chronic neck and back pain, impaired joint mobility, impaired balance and co-ordination and digestive malfunctions.

Despite the above findings, the results indicate that not only did participants prefer hipster jeans, they also reported wearing them more often. A low percentage of participants recognised the possibility of the connection between clothing and discomfort in posture, indicating decreased awareness to the possible effect of hipster jeans on posture.

Discomfort during basic movements leads to a person making compensatory movements, which have been shown in this study to contribute to incorrect body alignment. These compensations can result in sub-optimal functioning in activities of daily living, by negatively affecting factors such as production speed, endurance and ergonomics⁴⁰. Consequent reduced functioning in the work place, and medical conditions such as those previously mentioned, could have serious occupational implications for the individual^{41,42}.

A limitation of the study was that no control was exerted over the wearing of the two respective jeans other than the specified three hours prior to measurement. These time specifications were, however, specified in the Methods.

An ever increasing number of people is wearing hipster fit jeans, and being a current fashion trend it is unlikely that it will completely disappear from the market in the foreseeable future. The fashion industry caters for children as young as pre-primary age, creating a concern of which the consequences will only be known in years to come.

Conclusion

The aim of this study was to examine the influence of hipster jeans on body alignment compared with regular jeans. As shown in Table 11, from a lateral view, there was a tendency for posture to deviate from the plumb line if participants wore hipster jeans. This difference was statistically significant at the greater trochanter (95% CI[2 ; 17]) and the earlobe (95% CI[5 ; 24]). Very few people are aware of the correlation between the wearing of hipster jeans and alignment of the body. This lack of awareness results in body alignment patterns that deviate significantly from normal postural alignment. Prolonged deviating movement patterns can eventually result in permanent postural changes, the consequences of which will only be felt in later years.

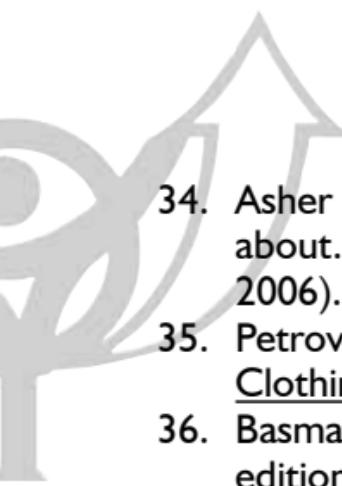
Further study is required to investigate the long term implications of the results of this study.

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