82 - POSTURAL ANALYSIS OF DISCOMFORT IN SITTING ON JOURNEYS INTERCITY BUSES

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INTRODUCTION

The interstate and intercity bus passenger in Brazil, is an essential public service, responsible for handling over 140 million passengers per year. The need to move long distances, people increasingly prioritize comfort, economy and security, which made the road one of the most important conventional volume of users (ANTT, 2010).

The posture is the arrangement that keeps the body segments to each other and in space, in a certain position in order to provide comfort, harmony, economy and support the body. Preparing the individual to perform a movement, and promotes support for the movement itself. The simple act of sitting, places the spine in an abnormal position. When you adopt a sitting posture, lower back, lumbar lordosis is reduced, suffering a reduction or elimination of its physiological curvature (TANAKA, 1997).

The seats of buses and cars offers a lumbar support in backrest not attending, the basic body necessity that is movement. The enforced immobility, in this case is the largest source of discomfort, aggravated by the pressure of weight on the ischial tuberosities, thighs, pelvis and trunk (LARICA, 2003).

Unable to leave the couch on trips to relief the pressures and for their accommodation, the passenger often twist or slide the pelvis forward, losing the support offered by the lumbar back, subjecting themselves to disturbances in musculoskeletal system, circulatory and soft tissue (QUEIROGA, 1999).

However is important to examine this question, considering that the possible pain and disconfort consequences did not originate solely from the individual's body structure, and such problems can be directly related to the environment (ASSUNÇÃO, 2003).

REVIEW

The sum of the actions and attitudes of static and dynamic passenger, maintaining standard positions with constant slopes, bends, rotations are mechanisms that can trigger the body system dysfunction, misalignment and unbalance itself (OLIVIER, 1998).

Moraes (2000), studying the distribution of total body mass in the seated position, shows that the support of the stem passes through the lowest point of the ischial tuberosities on the surface of the seat, so to sit, human supports about 75 % of all their total body mass on these tuberosities. This leads to an extremely high compression on the flow area of the buttocks. After 30 minutes in this situation, the sensory system need changes in posture to relieve these pressures.

According to Olivier (1998), incorrect body posture can cause discomfort and muscle compensation for other muscle groups not effective, compromising the security of the movements to be performed, undermining the position, disrupting the balance of body alignment, causing postural constraints, pain and injuries in short, medium or long term. According to Nachemson (2000), 80% of population had referred or reported some type of pain being more frequent between 25 and 45 years old in both sexes, reaching people at time of highest productivity, with higher incidence in the lumbar and cervical region.

The discomfort generated by the body posture and sitting posture are situations that can reach any individual, because of poor adaptation of the environment and their individual characteristics (VIEL, 2000).

Coury (1995) emphasizes that even though the seats used in various means of transport or for the large room presentations have good design, does not meet a basic need: to allow the movement of the body. Thus, the combination of little space with ergonomic seats just leads to an enforced immobility. This forced immobility becomes a major source of discomfort, aggravated by the compression of the total body mass on the ischial tuberosities, thighs and trunk.

It should be noted also that the passenger assumes postures due to the fatigue of your muscles, which is used continuously for long periods. Higher overload, especially on the spine, can cause muscle imbalances (TANAKA, 1997).

Therefore the seat should allow frequent changes in posture, to delay the onset of fatigue and pain. Although any profile seat, however, very comfortable at first, gradually became uncomfortable after a long time sitting (LARICA, 2003).

The factors that make up the physical dimension in the construction of comfort include product characteristics and the biomechanical aspects of the subject, making anthropometry essential for the design of space and devices for human use (TANAKA, 1997).

In the design of a seat considered as anthropometric variables necessary to define a product that will take when the man sitting posture. But even with a correctly sized seat, over time it will be changing the attitude, because the seat was designed from the theoretically most comfortable sitting posture or physiologically healthy. However, this posture may not be as enjoyable after a period. The problems related to anthropometric characteristics of subjects would be not associated only with increased total body mass, but also to differences in body size among populations (LIDA, 2005).

According to Assunção (2003) in defining the external environment of comfort and thereby identify comfort as a full psychological state, physiological and physical harmony between human well-being and its environment.

OBJECTIVE

The aim of this study was the discomfort caused by the passengers sitting posture during the bus trips. And identify the most affected regions by the discomfort; inventory sitting posture with the discomfort caused to individuals and to compare the measurements of the seats of the bus to the recommended standards.

METHODOLOGY

This research is characterized as descriptive and quantitative. Muszkat (2001) points out that the descriptive research attempts to describe the characteristics of a given population or phenomenon. Involves the use of standardized techniques of

data collection: questionnaire and systematic observation. It generally takes the form of survey. And that quantitative research believes that everything can be measured which means in figures reviews and information to classify them and analyze them.

To accomplish this, 78 subjects were approached, between 18 and 76 years, 47 women and 31 men, Station Road Vacaria-RS and Lages-SC, from all these states, and the choice of interviewees was made randomly.

All subjects were informed of the reason and approach, agreeing to participate signed the Informed Consent and answered a structured questionnaire with seven closed questions with identification data, position change during the trip, feeling the end of the trip, and applied to Scale Adapted discomfort (EKLUND AND CORLETT, 1986).

To perform the anthropometry of the seats, was requested authorization for a bus company bus, which requested confidentiality of their name, and this already provides services to more than 50 years between the states of RS and SC. Measurements were taken 42 seats in one of his coaches with conventional measuring devices simple (tape).

These measurements were analyzed based on the table static anthropometry measures, summarized the German standard DIN 33402 of 1981 (LIDA, 2005). The table shows the percentiles 5%, 50% and 95% used in accordance with the following logic: 50% percentile for measures which involve reach, as the seat height from the floor, and 95% percentile for measures involving a wide and / or length to width of the corridor.

RESULTS AND DISCUSSION

Most respondents (74.80%) make trips with a mean 04horas and among them, the most frequent reason for travel is to visit family. Since the respondents have a height between 1.93 and 1:53 cm, weighing 50 to 98 kg.

Table 1 – Anthropometric data of the passengers interviewed

MEASURES	AVERAGE
WEIGHT	73,6 KG
HEIGHT	1,74 CM

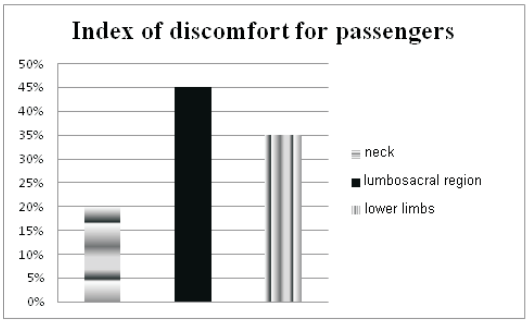
Almost half of the population (49%) aged 20 years or more is overweight, according to the Brazilian Institute of Geography and Statistics (IBGE, 2010). The average height and weight of the population are, respectively, 1.73 m and 69.4 kg. Already, the average of the creation of bus seats are respectively 1.70 cm and 67.7 kg (QUEIROGA, 1999).

Thus the data presented in this research show that the average measure of the respondents are indicated above the IBGE (2010) and Queiroga (1999).

We agree, therefore, the munchies, Larica (2003), which states that you must create a new seat trying to adapt the new measures found.

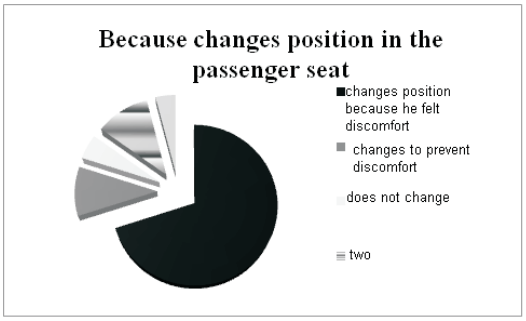
With respect to discomfort, the chart shows a 45% of respondents feel the lumbosacral area and 20% in the neck. This is due to sliding of the pelvis forward and the passenger accommodation in a false relative comfort. At rest the trunk against the backrest, the angle opens torso / thighs, relieving stress on the muscles pelvitroncanterianos. The lumbosacral area and cervical lordosis, however, are reversed and without support, subject to distortions in their structures and osteo-articular muscle, causing postural constraints, progressing to the discomfort (KNOPLICH, 2003).

Furthermore, 35% of respondents feel discomfort in the lower limbs, this occurs due to decreased movement of the same and the continued pressure of the buttocks and thighs against the seat. These factors together reduce the local circulation and return of blood to the heart, which in consequence over time leads to a decrease in temperature in the legs, tingling, numbness, pain and swelling, particularly in the feet, ankles and legs (OLIVIER, 1998).



Graph 1 - Index of discomfort for passengers.

Since about 90% of passengers changes position during the trip, was asked why he changes position (Figure 2).



Graph 2 - Because changes position in the passenger seat.

Keep the spine healthy requires periodic changes in posture and dynamic movement helps to promote circulation and reduce muscle fatigue. Sitting in any static position for a prolonged period will cause discomfort. Agreeing with the index found that around 70% of subjects changes position because she felt uncomfortable, 10% change to prevent discomfort and 11% both. Thus confirming the statement TANAKA (1997) regarding the independent variables are normal changes of positions and aim to

reduce the discomfort. These gestures, however, go unnoticed and are aimed at the reduction and are not associated with discomfort in the seat (KNOPLICH, 2003).

Table 2 shows the scaled values obtained and those given by German Standard DIN 33402 (LIDA, 2005)

Table 2 - Anthropometric Measurement of the seat on the bus.

ACRONYM	DEFINITION OF MEASURE	COLLECTED	LISTED	DIFFERNCE
A	Height floor to seat	42,0	52,0 (50%)	10,0
B	Backrest height	66,0	85,5 (95%)	19,5
C	Height of the seat arm	25,0	25,0 (50%)	0
D	Distances between the backs	74,5	77,0 (95%)	2,5
E	Distances between the seats (legroom)	60,8	113,5 (95)	52,7
F	Distances between one another and tilted back strainght	43,5	55,0 (95)	11,5

Being analyzed with the seat 45 cm, the width of the hips meets in the sitting posture of the 95% percentile. However, it can cause discomfort because the space does not allow moving the chair during his stay in the seat especially for individuals at percentiles above 95% or obese. Just measure the height of the seat arm (25cm) meets the 50% percentile. Other measures should meet even the 95% percentile, as required by larger venues would be unable to use a seat designed for the 50% percentile, or extremely uncomfortable in them (MONT'ALVÃO, 1998).

We compared measurements of buttock-knee length 95% percentile and the long-standing buttocks, there is mismatch between these measures and the distance between the seat back and the previous one. As the measure of one seat and the other is only 60.8 inches of space, which can also cause discomfort, and allows little movement (LARICA, 2003). The seat height obtained (66cm) is below the 5% percentile, so the heads of passengers in all percentile is above the back of the chair. And the distance between the inclined backrest is 74.5 cm and the distance between a straight-backed and the other is tilted 43.5 cm. Comparing them with anthropometric percentile 95%, you can see that there is little room for the passenger, between banks, and little possibility of movement and difficulty in / out of the chair (MONT'ALVÃO, 1998).

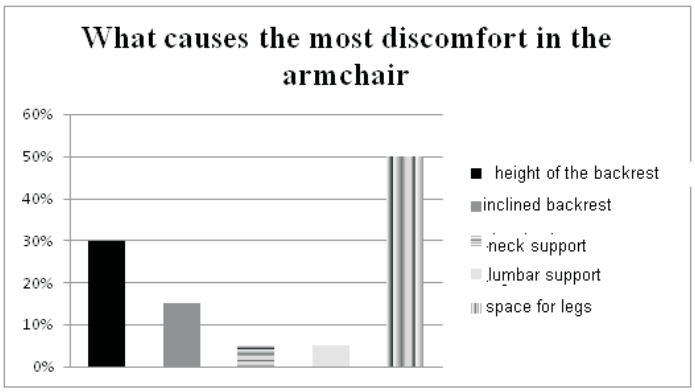


Figure 3. What causes the most discomfort in the armchair

In the analysis of Figure 3 showed that the biggest complaint about the discomfort of the chair refers to the backrest and legroom which prevents the movement of the individual, thus leading to restraint, thereby creating discomfort caused by postural constraint obtained by sitting on a seat below the basic anthropometric measures (MORAES, 2000).

CONCLUSION

In this study, we could perceive the dissatisfaction and discomfort of the bus passengers were interviewed regarding the chair that used during the trip, and immobility in the sitting posture in space and the limitations of the chair and the resulting positions of the lead passenger a room in search of comfort.

This quest for comfort and postural constraints generates as a result bring discomfort and pain in the neck, lumbsacral region and lower limbs and causing numbness and pain radiated to the lower limbs.

It is important to emphasize that the presence of a physiotherapist before passing on basic information for travel trade positions, as well as the achievement of stretching before travel can reduce this high level of discomfort, then there is the initiative for the creation of a new study to if there is improvement of discomfort with the use of stretching before travel, as this problem is being ever more evident.

And it becomes crucial to suggest more detailed studies on the anthropometry of the seats, keeping in mind that the median of Brazilians has been gradually increasing. Thus seeking the improvement of the existing seats that do not allow the movement of users, and can minimize postural imbalances and prevent pain and discomfort using this mode of transport.

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POSTURAL ANALYSIS OF DISCOMFORT IN SITTING ON JOURNEYS INTERCITY BUSES

ABSTRACT:
The need to move long distances, people increasingly prioritize comfort, economy and security, which made the road one of the most important conventional volume of users. The immobility in a seated position, within the limitations of chair and the resulting positions of the passenger to take a room in search of comfort. We conducted this study with the aim of analyzing the discomfort caused by sitting posture in passengers during the bus trips. We used a closed questions questionnaire, application of the statement of seat discomfort and anthropometry in 78 subjects between 18 and 76 years, 47 women and 31 men, Station Road Vacaria-RS to Lages-SC. The result obtained through analysis of data showed discomfort during travel regions in the neck (20%), lumbosacral (45%) and limbs (35%). Although the dissatisfaction have been reported for the space of the legs (36%) and the backrest support (22%), which are the cause of discomfort. The dissatisfaction and discomfort of bus passengers interviewed was evident, emphasizing the need for ergonomic guidelines by a qualified professional such as physiotherapist.
KEYWORDS: Discomfort, sitting position, Bus.

ANALYSE DU MALAISE POSTURAL DANS LA POSITION ASSISES DANS DES VOYAGES D'AUTOBUS INTERMUNICIPAIS

RÉSUMÉ :
Avec la nécessité de parcourir de longues distances, les gens de plus en plus la priorité au confort, l'économie et la sécurité, qui a une route classique de transport le plus important en termes d'utilisateurs. L'immobilité en position assise, les limitations de l'espace de la fauteuil et les positions résultant du passager de prendre une chambre à la recherche de confort. Cette étude est effectué dans le but d'analyser le malaise le malaise procoqué par la position d'assise des passagers pendant les voyages en bus. A été utilisés un questionnaire avec des questions fermées, l'application de la carte de la douleur et l'anthopométrie de la fauteuil, dans 78 individus âgés de 18 à 76 ans, 47 femmes et 31 hommes à la station de bus Vacaria-RS et Lages-SC. Le résultant obtenu par l'analyse des données a montré l'inconfort pendat les voage dans le cou (20%), lombo-sacrée (45%) et les membres (35%). En outre, des insuffisances on été rapportés pour l'espace des jambes (36) et le support de sossier (22%), qui sont la cause de l'incorfort. Il a été mécontentement manifeste et l'inconfort des passagers d'autobus interrogés, soulignant la nécessité de directives ergonomiques par un professionnel qualifié comme physiothérapeute.
MOTS-CLÉS : Malaise, position assise, les autobus

POSTURAL ANÁLISIS DE MOLESTIAS EN SESIÓN DE VIAJES AUTOBUSES INTERURBANOS

RESUMEN:
Con la necesidad de desplazarse largas distancias, la gente cada vez más prioridad a la comodidad, la economía y la seguridad, lo que hizo el camino del volumen convencionales más importantes de los usuarios. Inmovilidad en posición sentada, con las limitaciones de la silla y las posiciones resultantes de los pasajeros a tomar una habitación en busca de consuelo. Hemos realizado este estudio con el objetivo de analizar el malestar causado por la postura sentada de pasajeros durante los viajes de autobús. Se utilizó un cuestionario con preguntas cerradas, la aplicación de la declaración de incomodidad del asiento y la antropometría en 78 sujetos de entre 18 y 76 años, 47 mujeres y 31 hombres, camino de la estación Vacaria-RS y SC-Lages. El resultado obtenido a través del análisis de los datos mostró molestias durante regiones de viaje en el cuello (20%), lumbosacra (45%) y las extremidades (35%). Por otra parte, las deficiencias se han notificado por el espacio de las piernas (36%) y el respaldo de apoyo (22%), que son la causa del malestar. Se aprecia una clara insatisfacción y el malestar de los viajeros de autobús entrevistados, destacando la necesidad de pautas ergonómicas por un profesional calificado como fisioterapeuta.
PALABRAS CLAVE: Malestar, la posición de sentado, los autobuses

ANÁLISE DO DESCONFORTO POSTURAL NA POSIÇÃO SENTADA EM VIAGENS DE ÔNIBUS INTERMUNICIPAIS

RESUMO:
Com a necessidade de se mover por longas distâncias, as pessoas cada vez mais priorizam o conforto, a economia e a segurança, o que tornou o transporte rodoviário convencional um dos mais importantes em volume de usuários. A imobilidade na postura sentada, as limitações no espaço da poltrona e as consequentes posições assumidas levam o passageiro a uma acomodação na busca de conforto. Realizou-se este estudo com o objetivo de analisar o desconforto causado pela postura sentada nos passageiros durante as viagens de ônibus. Foi utilizado um questionário com perguntas fechadas, aplicação do mapa de desconforto e a antropometria do assento, em 78 indivíduos entre 18 e 76 anos, sendo 47 mulheres e 31 homens, na estação Rodoviária de Vacaria-RS e Lages-SC. O resultado obtido através da análise dos dados evidenciou desconforto durante a viagem em regiões na região do pescoço (20%), lombo-sacra (45%) e membros inferiores (35%). Além disso, foram relatadas inadequações para o espaço das pernas (36%) e o apoio do encosto (22%), sendo estes os causadores de desconforto. Ficou evidente a insatisfação e o desconforto dos passageiros de ônibus entrevistados, enfatizando a necessidade de orientações ergonômicas por um profissional habilitado, como o fisioterapeuta.
PALAVRAS CHAVE: Desconforto, posição sentada, ônibus.