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OCCUPATIONAL CYCLING IS A RISK FACTOR FOR ERECTILE DYSFUNCTION IN EAST AFRICA.
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OCCUPATIONAL CYCLING IS A RISK FACTOR FOR ERECTILE DYSFUNCTION IN EAST AFRICA.

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ABSTRACT

Background: **The association between bicycle riding and erectile dysfunction is controversial and hypothesised to be caused by pressure from the bicycle seat on the pudendal nerve.**
Objectives: **To evaluate erectile function in East African occupational cyclists (OC) using International Index of Erectile Function questionnaire in comparison to non-cyclists .**
Design: **A cross sectional study.**
Settings: **The environment of Eldoret town in Uasin Gishu county of Kenya.**
Subjects: **Male occupational cyclists aged 18-65 years**
Results: **Total International Index of Erectile Function scores were significantly lower in occupational cyclists versus non-occupational cyclists (19.8±3.4 vs. 21.6±2.2, P<0.05). Furthermore, Erectile Dysfunction (ED) rates were higher in the cyclist group (76% vs. 31%, p < 0.0001). Logistic regression indicated that the odds of reporting Erectile Dysfunction were 9.1 (95% CI: 5.4-15.5) times higher in cyclists compared to non-cyclists controls.**
Conclusion: **In East Africa, occupational cycling is associated with lower International Index of Erectile Function scores and higher rates of Erectile Dysfunction.**

INTRODUCTION

Extensive bicycle riding may have adverse effects on the sexual health of males. It has been hypothesised that the trapping of the pudendal nerve between the pubic arch and the bicycle seat can result in erectile dysfunction (ED) and consequent infertility (1). The repeated pedaling motions compress the nerves passing through the Alcock's canal and may contribute to the hypoesthesia and numbness experienced by many cyclists (2). Decrease in glanular and penile sensitivity, genital numbness and erectile dysfunction are all characteristics of Alcock's Syndrome (3).

The duration of cycling is thought to have a linear relationship with the development of ED. For instance, bicycling for more than three or more hours/week is linked to the development of ED (4). Furthermore, the saddle width and position may also contribute to the development of ED in riders. The narrow nose saddle has been demonstrated to cause great decrease in penile blood flow and partial pressure of oxygen, while a wider width saddle causes lesser effect on blood flow (5). On the other hand, the position of the saddle contributes to the pressure exerted at the perineum. A 10 degree tilt of the saddle was shown to cause a 40% reduction in perineal stress associated with development of ED (6,7).

East African occupational cyclists, commonly referred to as "Boda-Boda" taxi drivers, transport large loads of luggage and passengers daily on hard and sharp-nosed bicycle saddles usually on rough terrain. This may subject them to significant perineal trauma as well as reduced oxygen tension in blood flowing in the penile vasculature resulting in endothelial injury (8,9) and consequently to the development of ED. We hypothesise that Boda-boda taxi drivers report higher rates of ED compared to age-matched controls.

MATERIALS AND METHODS

Study Population: This cross sectional study was approved by the Institutional Research and Ethics Committee at Moi University (Eldoret, Kenya). The study recruited male subjects aged 18-65 years (Table 1) within the environs of Eldoret town in Uasin Gishu county of Kenya. Initial enrollment was aimed at men that were engaged in riding their bicycles for transporting goods or passengers as an occupation (Boda-boda cyclists). We then approached a control group by purposive sampling to sample cross sections of age matched groups that were made up of men

with similar demographics to the bike riders mainly self employed businessmen who do not undertake occupational bicycle cycling. Three hundred fifty two male subjects (n=173 riders, 179 non-riders) aged 18-65 years (Table 1) were recruited for this study.

Study Variables: After obtaining subject informed consent, bike riders and controls were asked to provide information about their current medical conditions, specifically co-morbidities associated with ED such as hypertension and diabetes. All interviews of bikers took place at the site where they gather to wait for customers (popularly referred to as the stage for cyclists) and at working places for non-riders (who mainly consisted of informal businessmen in the market and business stalls in the residential estates and market centres). The bike riders were also asked whether they transported passengers or luggage, the number of trips they made each day, their working hours, if they experienced any perineal or penile numbness and the presence of pain or numbness anywhere else in the body. Both groups were then asked to complete the International Index of Erectile Function (IIEF) with erectile dysfunction being defined as a total score of ≤21.

Statistical Analyses: Descriptive statistics included calculation of means, standard deviation and range following a Shapiro-Wilk test of normality. All outcome variables were normally distributed and therefore, differences between riders vs. non-riders were tested by one-way Analysis of variance (ANOVA). Furthermore, the factors that may be associated with IIEF scores were assessed by linear regression analysis. The multiple linear regression models for IIEF scores, included age, sexual activity and marital status. In addition, ED was also compared between the groups using a multivariate logistic regression after controlling for age, smoking history and co-morbidities such as hypertension and diabetes mellitus. Statistical computations were performed using the software packages SPSS, Version 18.0 (SPSS v18, Inc. Chicago, IL).

RESULTS

The study recruited 352 participants; 172 cyclists (mean age 31.7±8.9) and 179 non-cyclist controls (mean age 35.7.7±8.5) (Table 1). None of the respondents indicated that they were suffering from diabetes/ hypertension. However, approximately 10% (n= 18) vs. 1% (n =1) for the non-cyclists vs. cyclists respectively; reported that they were smokers. Twelve percent (n=21) of occupational cyclists reported that they were not sexually active. Furthermore, approximately 76% (n = 131) of cyclists reported that they experienced ED. In contrast, all of the non-cyclist reported that they were sexually active and only 33% (n = 61) experienced ED (Table1) . In addition, there was no significant difference in age, marital status or sexual activity between the groups (P>0.05) (Table 1). On the other hand, only 4.1 % of the cyclists (n=35) reported chronic perineal numbness and only 1.1% (n =8) reported the penile numbness after a days work. There were 71 cyclists (41%) that complained of pain, ache and numbness in other parts of the body such as joint, back chest and thighs numbness. Pain, aches and numbness in cyclists was negatively correlated with ED index (r = -0.309, P<0.0001).

Table 1
Descriptive characteristics of subjects

	Riders	Non-Riders
N	173	179
Age	31.7±9.0	35.7±8.5
Marital Status (M/S)	151/21	168/12
Sexual Active (Yes/No)	172/0	163/21
Trips/d	18±5	-
Hours Cycling/d	9.5±1.6	-
IIEF Score	18.0±3.2	21.6±2.3
ED (%)	76	33

†*Significantly different (P<0.05)*

IIEF scores were significantly lower in the occupational cyclists compared to non-cyclist controls (19.8±3.4 vs. 21.6±2.2: P<0.05) for cyclist vs. non-cyclist respectively. Occupational cycling was a significant predictor of IIEF scores (adjusted R2 = 0.30 (F = 153.2, (1, 350) P <0.001)). On the other hand, none of the other predictor variables (age, sexual activity and marital status) were significantly associated with IIEF scores. Moreover, the rates of ED were significantly higher in cyclist compared to non-cyclists (76% vs. 31%, p<0.0001). Logistic regression analysis indicated that the odds of reporting ED were 9.1 (95% CI: 5.4-15.5) times higher in cyclists compared to non-cyclists controls.

DISCUSSION

The purpose of this study was to analyze erectile function in a population of bicycle riders that were hypothesized to be at risk for ED secondary to repeated perineal trauma due to hard-nosed bicycle saddles. The findings from the study indicate that bicycle riders had significantly higher rates of ED and significantly lower total IIEF scores compared to age-matched non-cyclists controls. These findings suggest that prolonged cycling; as is the case with occupational riders (boda-boda) is an independent risk factor for the development of ED. However, our study design does not allow us to postulate the exact mechanism relating prolonged cycling and the

development of ED. We theorise that this may be due to trapping of the pudendal nerves between the hard-nosed bicycle saddle and the pubic arch resulting in diminished penile blood flow and hypoxic pudendal nerve damage (10,11).

East African occupational cyclists that were included in this study were relatively young men (<40 years); highly active (biking for approximately 8hrs/day) and relatively healthy with low rates of comorbidities associated with ED such as hypertension, diabetes and smoking. Therefore, the relatively high prevalence of ED (76% vs. 33%) observed in cyclists vs. age-matched controls respectively, suggests that bicycle riding is significantly associated with ED. These cyclists are expected to be at the peak of their sexual reproductive phase of life and thus, organic ED has serious implications on the sexuality of these young men. Typically, ED is usually associated with advancing age (>40 years) related to cardiovascular insufficiency (12). Cycling is an important mode of transport in east Africa and it is also associated with many health benefits (13).

It can however be associated with some health risk, erectile dysfunction being one of them, and this observation has been established in this study. Cycling is associated with changes in penile blood flow as demonstrated by Penile hemodynamic studies and perineal compression studies have demonstrated a reduction by an average of 50mmHg in penile blood pressure (14) and a decrease of partial pressure of oxygen (PO_2) during cycling (15). Peak systolic velocity in cavenosal artery has been demonstrated to decrease more in narrow unpadded saddle compare to wide heavily unpadded saddle. Saddles with a wide base distribute pressure away from the perineum (6, 16, 17), while narrow nosed saddles exerts pressure in the perineum leading to compression of perineal blood vessels. Coupled with prolonged irritation of the pudendal nerve, this has been established to result in decreased glandular and penile sensitivity, genital numbness and ED among riders 317 (3).

Furthermore, bicycle saddle type can differentially affect the amount of blood flow to the penis (14,15). Schwarzer *et al* using different saddle seats, including narrow heavily padded ,narrow saddle with medium padding and a V-shaped groove in the padded nose, wide unpadded leather seat and a special women's with a wide seat with medium padding and no nose, demonstrated that the latter gave the best results with a 22% reduction in penile blood flow. In this study, the amount of padding was not the most important factor that safeguards penile perfusion but the width of the saddle that provides adequate support to the pelvic bones without compression of the perineum. Moreover, saddle padding helps in preventing saddle-induced damage such as pudendal neuropathy (8, 7).Standard east-African occupational cyclists use hard pointed nose bicycle saddles; which are cheap and convenient and may partially explain the relatively high ED rates observed in this cohort. However, only 4.1% (n = 35) of the East African cyclist reported perineal numbness and only 1.1% (n = 8) penile numbness but most of them, 41% (n = 71) complained of pain, aches and numbness in other parts of the body such as joints, back, chest and thighs. This is consistent with findings in some professional cyclists (17).

Several approaches have been proposed to mitigate the effects of ED associated with prolonged cycling. Such approaches include, Intermittent interruption of cycling, using saddles with a wide surface area that would redistribute pressure away from the perineum, or gel saddles that lower pressure applied in the perineum (16, 6) to changing the body posture and adjustment of the angle of the bicycle hard nose saddle (18). Additionally, uses of heavy padding of the current saddle designs or redesigning the saddle are viable options to relieve the pressure from the perineum and thus ameliorate incidences of ED in cyclists (5, 7, 8). We recommend some of these approaches to occupational cyclists in east Africa to reduce the impact of cycling associated ED.

Limitations of the Study: This study had several limitations that may limit the generalizability of our findings. Firstly, we used a cross-sectional study design, which limits our ability to make causal inferences on the relation between cycling and ED. A longitudinal follow-up is recommended to test the association between cycling and ED. Secondly, this study employed questionnaires to study male sexuality – a culturally sensitive subject – it is thus, probable that subject response may closely mirror social desirability rather than the empirical findings. For this reason, future studies should aim at using objective measures of ED in occupational cyclists. Nevertheless, this study has merit in describing the relationship between occupational cycling and male sexual health in east-African.

In conclusion, East African occupational bicycling is associated lower IIEF scores and higher rates of ED compared to age-matched controls. Therefore, occupational cycling is a significant risk factor in the development of ED in east Africans. Several approaches may be employed by riders to minimize the risks of prolonged cycling such as; intermittent cycling, use of broad saddles, changing saddle position and heavily cushioning the saddle to reduce perineal nerve damage which is associated with development of ED.

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