

中国含糖饮料消费与干预的研究进展

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摘要: 含糖饮料作为添加糖的主要来源, 其与多种疾病密切相关, 已成为日益严重的公共卫生问题。本文重点探讨中国含糖饮料消费现状、不同人群及地区的消费差异, 并对当前国内主要干预策略进行梳理, 根据现有研究的论述, 儿童青少年是主要消费群体和干预对象, 学校是主要干预场景。当前政策多侧重倡导宣传, 针对性干预效果欠佳, 人群摄入量不断攀升。对含糖饮料摄入实施长期监测与干预, 符合国家医防协同、关口前移的政策导向。应通过强化政策执行力度, 采取更系统全面的干预措施, 切实解决含糖饮料的健康隐患。

关键词: 含糖饮料; 健康监测; 儿童健康; 学校卫生; 健康促进

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Research progress on monitoring and interventions for sugar-sweetened beverage consumption, China

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Abstract: Sugar-sweetened beverages, as the primary source of added sugars, are closely linked to multiple diseases and have become a public health concern. This paper focuses on examining the current consumption patterns of sugary drinks in China, identifying regional and demographic disparities in consumption, and reviewing key domestic intervention strategies. Existing studies suggest that children and adolescents constitute the primary consumer group and target population for interventions, with schools emerging as the main intervention setting. Current policies predominantly emphasize advocacy and publicity, with targeted interventions yielding limited effectiveness and population intake continuing to rise. Implementing long-term monitoring and intervention for sugar-sweetened beverage consumption aligns with national policy directives promoting coordinated medical and preventive approaches and shifting prevention efforts upstream. Strengthening policy enforcement and adopting more systematic and comprehensive intervention measures are essential to effectively address the health risks associated with sugar-sweetened beverages.

Keywords: Sugar-sweetened beverages; Health monitoring; Child health; School health; Health promotion

含糖饮料(sugar-sweetened beverages, SSBs)是指在饮料制作过程中添加了单糖或双糖、含糖量超过5%的各类饮品, 种类涵盖碳酸饮料、果蔬汁饮料、茶饮料、含乳饮料、功能饮料及咖啡饮料等^[1]。因甜味诱人、饱腹感低、易于获取且营销力度强, SSBs已成为能量摄入主要来源之一。由于近年来, 随着SSBs

消费规模扩大, 营养学、流行病学及公共卫生政策领域对其摄入量愈发关注。国内外较多研究提示, 过量摄入SSBs与龋齿、肥胖及多种慢性疾病的发生相关^[2-5]。目前多国已对SSBs摄入实施管控。国际经验显示, 针对SSBs的综合性政策工具, 如糖税、包装警示标识及营销限制等, 可在不同程度上减少消费者对SSBs的选择、购买和降低SSBs摄入量^[6-8]。随着SSBs消费增长, 中国SSBs生产与消费呈快速上升趋势。过量摄入对健康构成威胁, 亟需采取及时有效的干预措施。本文为针对中国人群的叙述性综述, 主要基于公开发表的我国居民SSBs消费监测、流行病学调查及干预研究文献, 系统梳理我国SSBs消费现状、不同人群和地区的消费差异, 以及现有干预措施的主

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要成效与局限,以期为我国后续开展更有针对性的防控策略提供参考。

1 SSBs 的危害:来自中国人群的证据

SSBs 具有高糖分、口感好且饱腹感弱的特点,往往易在不知不觉中增加能量的摄入。在体重、代谢、口腔与心理行为等方面皆有随着 SSBs 摄入增加,健康风险增加的趋势。

1.1 SSBs 增加体重,引起超重肥胖 越来越多研究表明,SSBs 摄入不仅增加总能量摄入,还可能通过果糖相关的代谢效应促进血脂异常、胰岛素抵抗和内脏脂肪积聚,进而与体重增加及腹部肥胖相关^[9-10]。一项基于北京中小学学生的横断面调查显示,每周饮用 ≥ 7 次者较每周饮用 < 1 次者,超重肥胖风险将增加 1.396 倍;而每日 ≥ 500 ml 者较 < 150 ml 者风险则增加 1.316 倍^[11]。在 6~17 岁儿童中观察到肥胖风险水平随着 SSBs 摄入频率呈阶梯上升趋势,且控制多因素后该增长模式依然存在^[12-13]。不同饮料摄入模式还存在一定风险差异。一项针对 3~17 岁儿童青少年大规模调查显示,以碳酸饮料与奶茶、功能饮料、植物混合饮料模式构成的多种 SSBs 摄入模式均与超重肥胖风险呈正相关,若同时偏好多种饮料模式,风险则最高^[14]。

1.2 SSBs 引起糖代谢紊乱及增加多种慢性病发病风险 糖代谢方面,一项基于前瞻性队列研究的系统综述表明,饮用 SSBs 与 2 型糖尿病、高血压、心血管病及全因死亡风险等均呈正相关,且呈剂量-反应关系。在控制总能量摄入和肥胖等混杂后,SSBs 摄入与 2 型糖尿病正相关仍存在^[15]。据 184 个国家的数据估算中,约一成新发 2 型糖尿病可归因于 SSBs 过量摄入,我国是贡献尤为突出的国家之一^[16]。一项多中心出生队列亦表明,孕前 SSBs 摄入与糖尿病风险呈梯度上升趋势^[17]。心血管结局方面,Meta 分析显示,SSBs 摄入每增加约 340 ml,高血压风险则增加 16%^[18]。一项基于 2002—2018 年全国性人口饮食风险与心血管疾病负担研究表明,SSBs 摄入是少数仍高于居民膳食指南推荐水平的膳食风险因素之一,并与缺血性心脏病死亡负担相关^[19]。SSBs 摄入还与高尿酸血症和痛风的风险增加相关且还存在性别差异。天津成年人的调查中,周摄入 ≥ 4 杯的男性高尿酸风险由 18%增至 49%;女性则增至 70%^[20]。

1.3 SSBs 致口腔健康受损 多项基于学生人群的分析揭示了过量 SSBs 摄入会对牙齿健康造成极大影响。一项基于厦门市 11 361 名 12~19 岁青少年的横断面研究显示,龋齿总体患病率为 56.9%,较高 SSBs 摄入与龋齿风险升高相关,调整后 OR 值为 1.54

(95% CI: 1.28 ~ 1.82)^[21]。南京市三年级患龋率达 45.2%,其中约 46.5% 的学生每周 SSBs 摄入 > 4 次,患龋学生 SSBs 摄入频率显著高于未患龋学生^[22]。一项基于儿童 4 年随访队列的研究发现,与 SSBs 持续较低摄入组相比,摄入量呈渐增趋势组儿童的菌斑指数及牙龈炎检出率更高;多因素调整后,其牙龈炎风险仍显著升高 4.42 倍,提示童年期至青春期过渡阶段较高水平的 SSBs 摄入可能通过促进菌斑堆积和局部酸性环境形成而增加牙周健康风险^[23]。

1.4 SSBs 与不健康心理及行为关联 SSBs 高摄入与多种不良心理健康结局及行为密切相关。全国性研究表明,SSBs 周摄入频率 > 4 次可致 12~18 岁儿童青少年心理症状风险显著增高^[24]。2020 年横断面调查显示,北京 7~17 岁的儿童日摄入 ≥ 1 份可致抑郁症状风险增高 2.28 倍、社交焦虑增加 1.1 倍^[25]。基于八个地区大样本学生调查表明,若高摄入基础上再度叠加高屏幕时间,抑郁风险则更突出^[26],手机成瘾可能在 SSBs 致不良心理中具有部分中介效应^[27]。此外,基于中国学龄前儿童中 SSBs 饮用与行为问题的关系研究表明,高 SSBs 摄入与学龄前儿童行为问题的患病率显著增加有关^[28]。

1990—2019 年,我国因过量 SSBs 所致的死亡人数从 23 975 人增至 46 634 人,疾病伤残调整生命年由 64.78 万人年增至 101.62 万人年^[29]。可见,SSBs 就如隐形的“甜蜜杀手”,严重威胁着居民的身心健康。

2 我国居民 SSBs 消费监测现状

2.1 居民 SSBs 总体摄入持续攀升 国际水平上我国居民 SSBs 摄入水平虽低于北美、西欧及拉美等高消费国家,但近二十余年呈现出明显的快速上升趋势,我国被划入“SSBs 摄入总体水平中等、但增长较快”的国家行列^[30]。全国营养监测数据显示,2002—2012 年我国居民 SSBs 摄入由 8.5% 增至 11.7%,另据 2010—2012 年全国成人监测资料,18 岁及以上居民 SSBs 消费率为 50.1%,其中男性为 49.2%,女性为 50.8%^[31-32]。需要指出的是,上述全国性数据时间相对较早,更多反映我国居民 SSBs 消费的阶段性水平。近年基于 18 省城市居民的调查显示,我国 3 岁及以上城市居民 SSBs 消费率为 11.35%;在饮用者中日均摄入量中位数已达 130.0 g,其中 13~17 岁青少年以 201.6 g 居全人群的首位^[33]。总体来看,我国居民含糖饮料消费问题仍值得持续关注,尤其儿童青少年仍是重点防控人群。

2.2 不同人群的摄入差异:儿童青少年位于 SSBs 暴露及摄入人群之首

(1) 儿童青少年: 1997—2011 年监测显示, 东北两省 7~17 岁人群周饮用 ≥ 3 次的比例由 16.5% 上升至 22.8%^[34], 潘峰等人对 3 岁及以上城市居民 SSBs 消费评估中, 亦表明 13~17 岁为消费率最高的年龄组^[33]。基于各地区的研究也印证该现象, 一项北京市横断面研究显示, 北京学龄儿童的 SSBs 消费率已达 88.4%, 周摄入量 ≥ 7 次已高达 57.1%^[11]; 崔玉丰等人东北两省 6~17 岁研究表明, 东北两省 6~17 岁饮用者日均摄入量的中位数达 166.67 ml/d^[34]。赵栋等人亦表明浙江地区学龄儿童 SSBs 饮用率已达 73.01%^[35]; 一项针对上海市 6~17 岁学生研究表明, SSBs 高频饮用已较为常见, 且可能与正常体重 1~5 年级学生较高的总胆固醇和低密度脂蛋白胆固醇, 6~12 年级学生较高的体重有关^[36]。总体而言, 儿童青少年是我国 SSBs 摄入最集中的人群。

(2) 成年人: 我国成年人群 SSBs 摄入量在国际上虽处于较低水平, 但年轻成人中摄入情况已日渐突出。2010—2012 年监测中, 50.1% 成人一年内曾饮用过 SSBs, 18~44 岁饮用率高达 65.4%, 显著高于 ≥ 60 岁组的 36.3%^[32]。基于 27 个城市的中国城市人群液体摄入调查显示, 18~55 岁成人日均总液体摄入量为 1 387 ml, SSBs 在总液体摄入贡献中位居前列^[37]。在年轻成人中, 尤其大学生群体, SSBs 摄入行为仍较为常见, 并与作息、体重变化及健康认知等因素相关^[38]。

(3) 老年人: 基于现有文献的叙述, 老年人的 SSBs 摄入水平显著低于年轻人。2010—2012 年中国成人 SSBs 数据显示, 18~44 岁、45~59 岁和 ≥ 60 岁人群的 SSBs 年消费率分别为 65.4%、47.0% 和 36.3%^[32]。基于 18 个省的调查显示, ≥ 60 岁组 3 天内 SSBs 消费率仅为 3.29%, 显著低于儿童青少年组^[33]。目前针对老年人 SSBs 消费情况的调查较缺乏, 结果相差较大, 但现有研究均提示, SSBs 相关干预的重点应更加关注更年轻人群。

2.3 不同地区 SSBs 的摄入存在差异 我国不同地区 SSBs 摄入在消费频率、消费量以及消费类型等均存在差异, 且与经济、地理环境及饮食等因素密切相关。郭海军等人表明, 当经济发展梯度由高向低(大城市—中小城市—普通农村—贫困农村)推移时, 人群 SSBs 消费率呈下降趋势^[32]。这一现象印证了经济发展水平与食品供给环境对 SSBs 摄入行为的“放大—约束”双重效应。汪云等人基于 15 个省份的调查显示, SSBs 消费可能性上, 城市高于农村, 东部高于中西部区域, 且学历、收入与消费可能性呈正相关; SSBs 摄入量上, 农村则反超城市, 中部高于西、东部地区^[39]。西部农村调查发现, 不同地区 SSBs 消费模

式上, 农村地区儿童如植物性饮料消费模式得分较高^[14]。赵栋等人对学龄儿童分析得出, 浙江山区儿童 SSBs 的月饮用率高达 84.28%, 显著高于同省其他区域^[35]。SSBs 摄入地区格局呈现复杂性, 地区饮食、气候及饮料可及性及种类, 亦可能是该复杂消费结构的潜在变量。

3 我国居民 SSBs 干预措施

3.1 政策层面的干预措施 政策文件倡导减少 SSBs 的摄入: 目前, 国家多项政策文件中均有涉及 SSBs 控制的倡导, 如《健康中国行动(2019—2030 年)》及《儿童青少年肥胖防控实施方案》分别提出, 加强糖分标识及对中小学及托幼机构限制高糖饮料的销售。《我国居民膳食指南(2022)》对每日添加糖设定上限 50 g, 更优 25 g 的双重阈值^[1]。口腔健康领域将“减糖”作为重要内容, 提出削减 SSBs 与高糖食品供应占比要求^[40]。国家层面发布的系列规制方案, 为各地开展 SSBs 干预实践提供了制度支撑与路径指引。

税收层面: 当下, 我国暂未形成 SSBs 税收政策, 仍处于探索阶段。美国及新加坡等国家已证实通过抬升 SSBs 税收, 可显著减少 SSBs 摄入量。尽管我国尚未落地专项含糖饮料税, 但已有相关学者进行了探索。国际研究显示, SSBs 税收政策通常可通过提高价格降低含糖饮料销售或购买量^[41]。谌孟瑶等学者提出, 若税率低于 5%, 对儿童肥胖的干预效能将是微弱的甚至可致归零; 而 20% 左右的税率则可触发消费的显著下滑, 可带来健康收益的放大与长期医疗负担的缓释^[42]。部分学者还建议将 SSBs 与烟酒等一并归为“健康税”范畴, 以减少 SSBs 带来的健康风险^[43]。虽然公众对税收支持不一致, 但精细化的税制设计可约束低收入群体的不健康消费行为, 以实现更广泛的健康效益。我国 SSBs 需求价格弹性为 0.26, 属于低弹性品类, 但与甜品、奶茶等高糖食品存在替代关联^[44], 征税虽能抑制 SSBs 消费, 但需警惕消费者转向消费其他高糖替代品的风险。国际糖税经验虽具有一定借鉴意义, 但税率设定及公众接受度等维度仍面临多重挑战。

3.2 环境层面的干预措施 **营销管控:** 我国尚未出台 SSBs 营销限制措施。儿童青少年是 SSBs 营销的重点暴露人群, 该群体的营销是管控靶点, 而电视、广播等数字媒介构成 SSBs 营销信息传播的主导渠道。2010 年, WHO 建议各国通过立法和监管手段限制面向儿童的高糖食品广告的投放。如美国要求 SSBs 广告需附带健康危害警示语; 智利则阻断 14 岁以下未成年人接触不健康饮料广告, 尤其对学校周边 SSBs 广告投放严格管控^[45]。目前我国尚未形成针对 SSBs

营销的管控,主要为倡议性通知。如饮料工业协会倡议企业加快研发健康产品,并作出不针对 12 周岁以下儿童开展饮料广告宣传的承诺^[46]。教育领域,北京市教育委员会发布通知,禁止校园内销售碳酸饮料等不利于健康的饮品,从校园环境入手间接削弱 SSBs 的可及性。成都市教育局教学评估中对学生携带 SSBs 超过 10% 的学校进行扣分。为有效落实 SSBs 营销的管控,或需从人群对 SSBs 营销暴露的接触入手,构建覆盖数字媒介、销售终端、校园场景等多维的综合性管控。

警示标签:国内部分城市已试行包装标识与警示措施。有研究指出“高添加糖警示+含糖量”的标签,往往可促使父母选择高糖饮料的比例显著降低 6.4%^[47];一项随机临床试验指出,添加糖警告以及禁止包装正面声明和图片可能会减少父母为幼儿购买高添加糖饮料^[48]。针对 SSBs 包装警示标识这一议题,多国已推行警示标签制度。如智利等国已构建加贴“高糖”“不健康”图形等警示标识制度^[49];新加坡则按 A~D 级分类,要求 C、D 级需在包装上突出标示,D 级则需禁止发布营销广告^[50]。我国虽已实施营养成分表强制标识,但统一的警示和分级制度目前尚未形成。政策层面,就营养标识和健康导向标签提出政策倡导,并发布《餐饮食品营养标识指南》等文件,但我国相关健康标识在标准化、强制实施及实际应用方面仍较有限^[51-52];地方实践方面,深圳已通过地方条例要求酒精饮料和碳酸饮料销售者设置健康损害提示标识;上海则进一步探索 SSBs“红、橙、绿”健康提示标识,并于 2023 年发布相关规范征求意见稿,在 150 余家试点场所先行应用。但警示标签的效果受信息内容和呈现形式重要影响,设计 SSBs 警示标签时,需进行权衡,使用直观且量化程度高的表达形式。

3.3 个体层面的干预措施 个人健康教育与认知提升:健康教育是减少 SSBs 消费的基础性策略,其核心在于通过知识传递、态度转变和行为引导实现长期干预效果。国内现有针对个体层面的 SSBs 干预主要集中于学校场景,内容多围绕 SSBs 与肥胖、龋齿及代谢异常等健康风险,以及含糖量识别和健康饮品选择等知识展开。现有国内研究显示,健康教育可提升 SSBs 认知及摄入,但目前干预措施皆集中于儿童青少年中。徐国红等人采用“3-PR”框架的互动式健康教育课程能有效改善小学生对 SSBs 的认知和摄入行为^[53]。张琴等以周行为日志为工具,结合讲座、主题班会等方式亦可控制家长层面的购买与孩子饮用监督行为,降低 SSBs 的摄入^[54]。黄莉丽等人将知行框架与自我效能结合的分阶段课程,也显示可增强

儿童自我管理信心,并带来风险认知与摄入行为的同步优化^[55]。儿童对 SSBs 相关知识的掌握总体仍显不足,健康教育在提升认知方面虽具有积极作用,但单一教育干预的效果往往有限,知行脱节的现象使得难以有效抗衡当下复杂的消费环境所形成的影响^[56],要获得长期维持仍有赖于持续强化或与家庭、学校和环境支持措施的协同配合^[57]。

家庭支持与行为强化:家庭支持是强化儿童青少年减糖行为的重要环节,其作用主要体现在家长示范、家庭供给管理、日常监督及家校协同等方面。学校与家庭联合干预研究表明,应将提升学生 SSBs 知识和改善家庭 SSBs 消费环境作为针对学童的干预措施,特别是那些生活在城市地区且父母教育水平较低的儿童^[58]。一项基于东北中小学生父母的纵向研究表明,父母营养知识水平每提高 1 分,子女 SSBs 周摄入量将减少 13.39 ml,且农村户籍家庭效果更显著^[59]。基于南京小学的随机对照试验表明,学校联合家庭干预较单纯学校干预更有利于降低学龄儿童 SSBs 摄入,且在 1 年后仍显示出一定的持续效果^[60]。此外,范晓汭等人以南京市 4 所小学为示范探讨的学校-家庭-社区的综合干预进一步加入了学校层面的干预,研究证实综合性干预提高了中小学生对 SSBs 知识知晓率、改善了态度,并可促进少喝 SSBs^[61]。以家长为核心的研究也提示,通过社交媒体开展家长互动、目标设定和反馈等措施,有助于改善学龄前儿童饮食行为,为后续开展儿童 SSBs 家庭干预提供了参考^[62]。上述研究提示,SSBs 干预不宜局限于学校场景,还应将家长参与、家庭供给控制和家校协同纳入综合干预体系,以促进健康行为的巩固与长期维持。

4 挑战与建议

我国对于 SSBs 的管控,政策力度欠佳,税收等经济制度化仍需探索,暂未对 SSBs 的消费和供应设置有效激励与约束;健康教育、营养标识、校园管理、商业广告合规监管等,这些本应形成闭环干预,但内在联动性不足,减糖措施仍面临实质性阻滞;建议加大减糖政策的实施力度,加强卫生健康、教育、市场监管、税务等部门间协同机制,形成“试点先行-全域推广”的路径选择,构建多层次、可持续的 SSBs 管理框架。

监测口径不统一、覆盖范围有限、追踪机制的缺失等是当前 SSBs 监测数据体系的主要缺陷。现有数据主要来源于分散性的调查,SSBs 的定义、分类及测量工具的非标准化,对其精准监测形成了双重制约;监测人群向儿童青少年倾斜,成年及老年群体的连续性监测存在显著缺口。有必要建立统一标准的 SSBs

消费监测系统;统一 SSBs 定义、分类及测量工具是监测的基础,以掌握 SSBs 摄入长期趋势。

当下 SSBs 研究多聚焦于单一城市或特定中小學生,较多忽略了年轻成人这一高摄入群体;干预周期对结局推断有一定限制;结局指标的选择聚焦于知识与行为改善,较少与体重、代谢风险相关指标改善相联系。未来研究需驱动向长期、多维度策略转变;聚焦体重、代谢等健康指标的实际改善;将单一干预升级为“教育 + 环境 + 政策”的复合性策略,将干预从学校延伸至家庭与社区体系,融合售卖环境优化等,开发更适配的个性化干预工具。

5 结 论

SSBs 对健康的负面影响因摄入的日益增加而逐渐凸显,尤其对于儿童青少年这一高危人群已成为不容忽视的健康问题。国内现有干预措施未能有效遏制 SSBs 消费,SSBs 消费不断攀升;为应对 SSBs 不断蔓延这一严峻的健康危机,未来干预还需超越单一模式,转向构建“医防融合”的综合体系,从政策执行力度、干预方式及深度等方面进行探索。

利益冲突声明 本研究不存在任何利益冲突

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